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PROCEEDINGS  
OF THE  
MINNESOTA ACADEMY OF SCIENCES  
VOLUME IV. BULLETIN II.

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221st Meeting, January 8, 1895.

ANNUAL MEETING.

Nine persons present, Vice President Sudduth presiding.

Secretary C. W. Hall reported \$169 collected during the year, of which \$129 was in dues of members.

The corresponding secretary reported accessions to the library for 1894, as follows:

United States publications.....	521
Foreign publications .....	523
Total .....	1,054

Of this total 501 were bound volumes.

Report of the Corresponding Secretary of publications received during the year 1894:

*Agram, Hungary.*—Jugoslavenska Akademija. Ljetopis, Vol. 7; 8; Rad, 16, 17.

*Agricultural College, Mich.*—Michigan Agricultural College and Exper. Station.

Bulletins, Nos. 96-112.

*Albany, N. Y.*—State Library. Annual Reports, 74 and 75.

State Museum: Annual Report, 45 and 46. Report of the Entomologist, 4-9, p. 184. Bulletin, Vol. III, No. 11.

University of New York: Extension Bulletin, Nos. 5, 7, 8; Regents' Report No. 106.

*Altenburg, Germany.*—Naturforschende Gesellschaft des Osterlandes. Mittheilungen, Vol. VI.

*Amiens, France.*—Société Linnéenne du Nord: Bulletin, Vol. XI, Nos. 247-258.

*Baltimore, Md.*—Johns Hopkins University: University Circular, Nos. 106-114.

*Bamberg, Germany.*—Naturforschende Gesellschaft: Bericht, Vol. XVI.

*Basel, Switzerland.*—Naturforschende Gesellschaft. Verhandlungen, 1892.

*Berlin, Germany.*—R. Friedländer & Sohn: Naturae novitates, 1893, Nos. 21-24. 1894, Nos. 1-18.

*Bern, Switzerland.*—Entomologische Gesellschaft: Mittheilungen, Vol. IX, Nos. 1, 3.

*Béziers, France.*—Société d' Etude les Sciences Naturelles: Bulletin, Vol. XV.

*Bologna, Italy.*—Accademia delle Scienze dell' Instituto di Bologna. Memorie, Ser. V, Vol. II.

*Bombay, India.*—Royal Asiatic Society: Journal, Vol. XVIII, Nos. 49 and 50.

*Bône, Africa.*—Academia d' Hippone: Comptes Rendus, 1893.

*Bonn, Germany.*—Naturhistorischer Verein: Verhandlungen, Vol. I.

*Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vols. XXVIII, XXIX.

*Boston, Mass.*—Boston Society of Natural History: Proceedings, Vol. XXVI.

*Boston, Mass.*—Horticultural Society: Transactions, 1893.

*Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen, Vol. XIII, Part 1.

*Brisbane, Queensland.*—Geological Survey of Queensland: Report of Annual Progress, 1891, 1892, 1893.

*Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, Vol. X. Index to Vols. VII to IX.

*Brünn, Austria.*—Naturforschender Verein: Bericht, Vols. X and XI. Verhandlungen, Vols. XXX and XXXI.



- Bruxelles, Belgium.*—Société Belge de Microscopie: Annales, Vol. xvii, Part 2; Vol. xviii, Part 1; Bulletin, Vol. xix, No. 10; Vol. xx, Nos. 1-9.
- Bruxelles, Belgium.*—Société Entomologique de Belgique: Annales, Vol. xxxviii, Parts 7, 8, 9, 10, 11.
- Bruxelles, Belgium.*—Société Royale de Botanique de Belgique: Bulletin, Vols. xxx and xxxi.
- Buenos Aires, Argentine.*—Instituto Geographico, Argentino: Bulletin, Vol. xiv, Nos. 5-8; Vol. xv, Nos. 1-8.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Annales, Vols. xxxv and xxxvi.
- Cairo, Egypt.*—Institut Egyptien: Bulletin, Vol. iv, Nos. 6-10. Index.
- Calcutta, India.*—Geological Survey of India: Records, Vol. xxvii, Nos. 1, 2, 3; Memoirs, Vol. ii, No. 1.
- Cambridge, Mass.*—Museum of Comparative Zoology: Annual Report 1892-'93; Bulletin, Vol. xvi, Nos. 13, 14, 15; Vol. xxiv, Nos. 4-7; Vol. xxv, Nos. 1-12.
- Cardiff, England.*—Naturalist's Society: Report and Trans., Vols. xxiv and xxv.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Vols. xxxii-xxxv.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. x.
- Chicago, Ill.*—Field Columbian Museum: Guide to Museum.
- Chicago, Ill.*—Journal of Geology: Vols. i and ii.
- Chur, Switzerland.*—Naturforschende Gesellschaft Graubündes: Jahresbericht, Vol. xxxvi.
- Cincinnati, Ohio.*—Society of Natural History: Journal, Vol. i, Nos. 1 and 2; Vol. iii, Nos. 3 and 4; Vol. iv, Nos. 1-4; Vol. xvi, No. 4; Vol. xvii, Nos. 1, 2, 3.
- College Hill, Mass.*—Tufts College: College Studies, Nos. 1 and 2.
- Denver, Col.*—Colorado Scientific Society: Gold Bearing Quartz; Solution of Equation; Standard Value; Cripple Creek Ores; Artesian Waters; Camp Floyd District; A Suspected New Mineral.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vols. i and ii.
- Des Moines, Iowa.*—Iowa Academy of Science: Proceedings, Vol. 2 Part 4.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxvii.
- Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 188-213.
- Frankfurt, a d Oder, Germany.*—Naturwissenschaftlicher Verein: Helios, Vol. xi, Nos. 6-12; Vol. xii, Nos. 1-6. Societatum Litteræ, Vol. vii, Nos. 4-12; Vol. viii, Nos. 1-9.
- Geneve, Switzerland.*—Société de Géographie: Le Globe, Vol. xxxiii.
- Georgetown, South Africa.*—Royal Agricult. and Commercial Society: Journal, Vol. viii.



- Glasgow, Scotland.*—Natural History Society of Glasgow: Proc. and Trans., Vol. III, Part 3.
- Görlitz, Germany.*—Naturforschende Gesellschaft: Abhandlungen, Vol. xx.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mittheilungen, 1893.
- Greifswald, Germany.*—Naturwissenschaftlicher Verein: Mittheilungen, 1893.
- Gueret, France.*—Société des Sciences Naturelles: Memoires, Ser. 2, Vol. III.
- Guströw, Germany.*—Verein die Freunde der Naturgeschichte: Archiv, Vol. XLVI and XLVII.
- Habana, Cuba.*—Academia di Ciencias. Anales, Vol. xxx.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proc. and Trans., Vol. I, Part 3.
- Halle a d Saale, Germany.*—Kais. Leopold. Carol. Akademie: Leopoldiana, Parts 27, 28 and 29. Nova Acta, Vol. LVI, No. 3.
- Hamburg, Germany.*—Naturwissenschaftlicher Verein: Verhandlungen, 1893.
- Hamilton, Canada.*—Hamilton Association: Journal and Proceedings, No. 10.
- Hannover, Germany.*—Naturhistorische Gesellschaft: Jahresbericht, Vols. XLII and XLIII.
- Harlem, Netherlands.*—Musée Teyler: Archives, Vol. IV, Parts 1 and 2.
- Indianapolis, Ind.*—Indiana Academy of Sciences: Proceedings, 1892 and 1893.
- Innsbruck, Austria.*—Naturwissenschaftlich-Medizinischer Verein: Berichte, Vol. XXI.
- Iowa City, Iowa.*—Iowa Historical Society: Record, Vol. x. Documentary Material, Parts 1 and 2.
- Jefferson City, Missouri.*—Geological Survey of Missouri: Reports, Vols. 4, 5, 6, 7.
- Kassel, Germany.*—Verein für Naturkunde: Abhandlungen und Berichte, Vol. XXXIX.
- Kharkow, Russia.*—Société Naturalistes à l' Université Imp. de Kharkow: Travaux, Vol. XXVII.
- Kief, Russia.*—Kief Society of Naturalists: Memoires, Vol. 12.
- Kiel, Germany.*—Naturwissenschaftlicher Verein für Schleswig-Holstein: Schriften, Vol. x, No. 1.
- Kjöbenhavn, Denmark.*—Naturhistoriske Forening: Meddelelser, 1894.
- Krakowie, Austria.*—Akademie der Wissenschaften: Rosprawy, Vol. II.
- Landshut, Germany.*—Botanischer Verein: Berichte, Vol. XIII.
- Lansing, Mich.*—State Agricultural College: Bulletin Experiment Station, Nos. 96-112.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vol. XXIX.
- Lawrence, Kans.*—Kansas State University: University Quarterly, Vol. II, Parts 1 and 4; Vol. III, Parts 1 and 2.

- Le Havre, France.*—Société de Géologie de Normandie: Bulletin, Vol. xiv.
- Liège, Belgium.*—Société Géologique de Belgique: Annales, Vols. xviii, xix, xx.
- Lyon, France.*—Société Linnéenne de Lyon: Annales, 1891, 1892, 1893.
- Madison, Wis.*—Wisconsin Academy of Sciences, Arts and Letters: Transactions, Vol. ix.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs and Proceedings, Vol. vii, Nos. 2, 3. Vol. viii, Nos. 1 and 2.
- Melbourne, Australia.*—Public Library, Museum and National Gallery: Report of Trustees, 1892.
- Melbourne, Australia.*—Royal Geographical Society of Australasia: Transactions, Vol. xi.
- Milano, Italy.*—Società Italiana di Scienze Naturali: Atti, Vol. xxxiv, Nos. 3, 4.
- Milwaukee, Wis.*—Public Museum of Milwaukee: Annual Report, Vol. xi.
- Minneapolis, Minn.*—Geological and Natural History Survey of Minnesota: Annual Report, Vols. xx, xxi. Bulletin, Nos. 8 and 10.
- Montevideo, Uruguay.*—Museo Nacional: Annales, 1894.
- Montgomery, Ala.*—Geological Survey of Alabama: Blount Mt., 1893.
- Montreal, Canada.*—Canadian Record of Science: Record, Vol. v, Nos. 6 and 7.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin, 1892, Nos. 3, 4. 1893 and 1894, No. 1.
- Münster, Germany.*—Provincial-Verein für Wissenschaft und Kunst: Jahresbericht, Vol. xxi.
- Nashville, Tenn.*—State Board of Health: Bulletin, Vol. ix, Nos. 3-11. Vol. x, Nos. 1-5.
- Neuchâtel, Switzerland.*—Société des Sciences Naturelles: Bulletin, Vols. xviii, xix, xx.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxv, Part 4. Vol. xxvi, Parts 1-3.
- New York, N. Y.*—American Museum of Natural History: Annual Report, 1893. Bulletin, Vol. v.
- New York, N. Y.*—Linnean Society: Abstracts of Proceedings, Nos. 5 and 6.
- New York, N. Y.*—New York Microscopical Society: Journal, Vol. ix, No. 4. Vol. x, Nos. 1, 2, 3.
- New York, N. Y.*—Torry Botanical Club: Bulletin, Vol. xx, Nos. 7-12. Vol. xxi.
- Nürnberg, Germany.*—Naturhistorische Gesellschaft: Abhandlungen, Vol. x, No. 2.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Annual Reports, Vols. v, vi. Maps.



- Padova, Italy.*—Società Veneto-Trentina di Scienze Naturali: Atti, Vol. 1, No. 2. Bulletin, Vol. v, Nos. 3, 4.
- Penzance, England.*—Natural History and Antiquarian Society: Report and Transactions, 1893-94.
- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. xi, Part 8.
- Philadelphia, Pa.*—Academy of Natural Sciences: Proceedings, 1894.
- Philadelphia, Pa.*—Wagner Free Institute of Science: Transactions, Vol. iii, Part 3.
- Port Louis, Mauritius.*—Royal Alfred Observatory: Annual Report, 1892. Meteorological Observations, 1892.
- Prag, Bohemia.*—K. Böhmisches Gesellschaft der Wissenschaften: Jahresbericht, 1892, 1893. Sitzungsberichte, 1892, 1893.
- Providence, R. I.*—Rhode Island Historical Society: Publication, Vol. i, No. 4.
- Regensburg, Germany.*—Naturwissenschaftlicher Verein: Berichte, Vol. iv.
- Reichenberg, Bohemia.*—Verein der Naturfreunde: Mittheilungen, Vols. xxiv, xxv.
- Riga, Russia.*—Naturforscherverein: Korrespondenzblatt, Vol. xxxvi.
- Rio De Janeiro, Brazil.*—Instituto Historico, Geographico y Ethnographico: Revista Trimensual, Vol. lv, Part 2.
- Rio De Janeiro, Brazil.*—Museu Nacional: Archivos, Vol. viii.
- Rovereto, Austria.*—Accademia degli Agiati in Rovereto: Atti, 1892, 1893.
- Sacramento, Cal.*—California State Mining Bureau: Report, Vol. xi. Bulletin, No. 4.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: Bericht, 1891-1892.
- St. John's New Brunswick.*—Natural History Society: Bulletin, No. 11.
- Saint-lô, France.*—Société d'Agriculture et d'Histoire Naturelle de la Manche: Memoires et Docum. Vol. xi.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, 1894.
- St. Louis, Mo.*—St. Louis Academy of Science: Transactions, Vol. vi, Nos. 8-18.
- Sankt Peterburg, Russia.*—Imp. Academy of Sciences: Memors, Vol. xxxix, No. 1; Vol. xl, No. 1.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vol. xi, Nos. 5-10; Vol. xii, Nos. 1-7; Memoirs, Vol. 4:3, 9:2; 10:2; 11:2; 12:2.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vol. iv, Part 1, 2.
- Santiago, Chile.*—Société Scientifique du Chile: Actes, Vol. iii, Nos. 1-5.
- Semur-en-Auxois, France.*—Société des Sciences Historiques et Naturelles: Bulletin, No. 7.
- Sydney, New South Wales.*—Australian Museum: Report of Trustees, 1892.



- Sydney, New South Wales.*—Geological Survey: Annual Report, 1893; Memoirs, No. 5; Records, Vol. iv, Part 1, 2; Index to Vol. III.
- Sydney, New South Wales.*—Royal Society of New South Wales: Journal, Vol. xxvii.
- Stavanger, Norway.*—Stavanger Museum: Aarsberetning, 1892.
- Stockholm, Sweden.*—Geologiska Byron: Afhandlingar, C. Nos. 116-134. Maps.
- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Bihang, Vol. xviii; Ofversigt, 1889-1892.
- Strassburg, Germany.*—Geologischen Landes-Untersuchung von Elsass-Lothringen, Mittheilungen, Vol. iv, Nos. 2, 3.
- Thorn, Germany.*—Copernicus Verein für Wissenschaft: Mittheilungen, Vols. viii, ix.
- Tokio, Japan.*—Deutsche Gesellschaft für Natur und Völkerkunde: Mittheilungen, Vol. vi, Nos. 52, 53, 54.
- Topeka, Kans.*—Kansas Academy of Sciences: Transactions, Vol. xiii.
- Torino, Italy.*—Museo Zoologico: Bulletin, Vol. vii, Nos. 133-150. Vol. ix. Nos. 166-192.
- Toronto, Canada.*—Canadian Institut: Annual Report, 1892; 1893. Transactions, Vol. iii, Nos. 1, 2; Vol. iv, No. 1.
- Toulouse, France.*—Academie des Sciences: Memoires, Vol. v.
- Toulouse, France.*—Revue de Botanique. Revue, Vols. 6-11.
- Urbana, Ill.*—Illinois State Laboratory of Natural History: Ornithology, Vol. i.
- Washington, D. C.*—Bureau of American Ethnology: Annual Reports, Vols. viii, ix, x; The Maya Year; Wabashan Language; Salishan Languages; Chinookan Language.
- Washington, D. C.*—U. S. Geological Survey: Annual Reports, 1889, 1890, 1891; Monographs, Vols. xvii-xxii. Mineral Resources, 1891, 1892, 1893. Bulletins, Nos. 83-86, 90-117. Survey of the Terr., Vol. xii. Atlas of Eureka District.
- Washington, D. C.*—United States National Museum: Bulletin, Nos. 43-46; Proceedings, Vols. xv, xvi.
- Washington, D. C.*—Department of the Interior—Patent Office: Official Gazette, Vols. lxxv, lxxviii, lxxix, Nos. 1-11.
- Washington, D. C.*—Smithsonian Institution: Annual Report, 1891.
- Wiesbaden, Germany.*—Naturhistorischer Verein für Naturkunde: Jahresbucher, Vol. xlvii.
- Winnipeg, Manitoba.*—Historical and Scientific Society: Annual Report, 1892, 1893; Transactions, Nos. 44-47.
- Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrsschrift, Vol. xxxviii, Nos. 3, 4; Vol. xxxix, Nos. 1, 2.
- Zwickau, Germany.*—Verein für Naturkunde: Jahresbericht, 1892, 1893.

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*National.*—American Association for the Advancement of Science: Proceedings, Vol. xlii, 1893.

*International.*—Australian Association for the Advancement of Science:  
Report, Vols. III, IV, V.

The Secretary was directed to cast the ballot of the Academy for the following officers:

President,	- - - - -	H. L. Osborn.
Vice President,	- - - - -	W. X. Sudduth.
Recording Secretary,	- - -	C. W. Hall.
Treasurer,	- - - - -	E. C. Gale.
Corresponding Secretary,	- -	C. P. Berkey.
Trustees for three years,	-	{ H. V. Winchell. Verdine Trusdell.

A paper on The Classification of the Sexual Affinities of *Prunus americana*, by C. W. H. Heideman of New Ulm, was presented.

[ABSTRACT]

The uncertainty of regular annual fruiting of plums in the Northwest, where only the native *Prunus americana* in its many varieties has been found sufficiently hardy to endure the climatic conditions, has long been a difficult problem in Horticulture. The author undertook to determine the causes underlying this recurring non-productiveness in certain trees.

An examination of plum flowers showed that the following types occurred:

Hermaphrodite—Stamens and pistil present and maturing at same time.

Proterogynous—Receptive period of stigma expiring before pollen matures.

Proterandrous—Pollen discharged before stigma becomes receptive.

Long-styled—Style nearly twice as long as stamens.

Short-styled—Stamens nearly twice as long as styles.

Gynodioecious—Anthers aborted.

Andromonoecious—Pistils aborted.

Hermaphrodite flowers are the only ones capable of self pollination, all the other types requiring cross-pollination. Trees with hermaphrodite flowers are now rarely found in the wild state.

By his experiments the author found that certain crosses produced large, fine fruit while other crosses resulted in the production of inferior fruit, or even no fruit at all. Of all the crosses possible between plants bearing these different types of flowers he found that only the eight following combinations would yield a desirable fruit:

Hermaphrodite X Hermaphrodite.

Hermaphrodite X Proterandrous.

Hermaphrodite X Proterogynous.



Proterandrous X Proterogynous.  
Short-styled X Long-styled.  
Short-styled X Gynodioecious.  
Long-styled X Gynodioecious.  
Andromonoecious X Gynodioecious.

**222d Meeting, February 5, 1895.**

Fifteen persons present, Vice President Sudduth presiding.

A paper on Special Forms of Ossification, by Dean W. X. Sudduth, was read, illustrated from specially prepared lantern slides.

**223d Meeting, March 6, 1895.**

The Minnesota Academy having accepted an invitation from the St. Paul Academy of Science to unite with them in a joint meeting of the two Academies for the month of March, it convened with the St. Paul Academy in the rooms of the St. Paul Commercial Club, Germania Bank Building, St. Paul, by invitation of that body. About 35 persons present. Rev. C. E. Mitchell, President of the St. Paul Academy of Science, presided.

The following program was presented:

The Physical Features of the Lake of the Woods, by Professor MacMillan, State Botanist of Minnesota.

Psychic Effects of the Weather, by Edw. A. Beals, Observer U. S. Weather Bureau.

Geology and Flora of the Mountain Region of Northeastern Montana, by R. G. McGinnis, Secretary of the St. Paul Commercial Club.

At the close of the meeting Secretary Hall, on behalf of the Minnesota Academy of Natural Sciences, invited the St. Paul Academy of Science to join them in a meeting to be held in the public library, Minneapolis, on April 2nd. The invitation was very cordially accepted.

**224th Meeting, April 2, 1895.**

Twenty-one persons present: President Osborn presiding.

The St. Paul Academy of Science, as the guest of the Academy, was represented by several members. The museum



was opened and lighted for the inspection of members of the Academy and visiting friends.

The following program was presented:

Some Queer Forms of Shell Fish, by President Osborn.

The Relation of Fatigue to Social, Moral and Educational Progress, by H. S. Baker:

[ABSTRACT.]

All movements of mind or muscle result in the destruction of some kind or kinds of tissue, and the products of metabolism are thrown into the blood. The prompt removal of this debris of brain or muscle, is necessary for the health and happiness of the individual and for the best work of mind and body, because it is decidedly toxic to all organs. The brain is the motive power, and all fatigue is brain fatigue. The cells of some center are exhausted by every muscular movement. The liberal use of proteids helps the system to rally after fatigue.

Since all fatigue is brain fatigue, we should remember that we cannot do both mental and muscular work well at the same time. The student should do as little physical work as possible, before he begins his daily tasks. Continued hard work of mind and body in the same day, brings in its train disease of the brain, heart, stomach. We do not feed a horse when he is very tired because the stomach will not digest the food.

Physiological Psychology of the Emotions: The emotions produce fatigue rapidly. Emotions which are evil and violent, as anger and covetousness, consume the brain cells most rapidly and throw into the blood compounds containing nitrogen, which are very poisonous. Each emotion throws into the blood a different substance, or ash, as it may be called. Those which are holy, as worship and the social feelings, throw into the circulation substances which are good tonics to the entire system. The child who is praised for good conduct, by that act, has his intellect improved. Both the scold and the scolded become more stupid by their feelings. Each emotion produces a different odor in the perspiration, which enables a dog to follow his master in a crowd. To be disagreeable to a person is to give him blood-poison. Use of the intellect is reasonably tonic.

The higher feelings, such as the religious and social, first feel the effect of fatigue. A tired man may lose interest in his Bible and be cross to his family, but still be able to think connectedly. A man may drive a sharp bargain long after he can appreciate a painting or do an unselfish act. The man, benevolent on Monday morning, may be miserly Saturday afternoon. Self control also disappears with the advent of fatigue and the tired woman cries for nothing, the brakes are off so to speak, and the feelings run riot.

Both teachers and children should sit whenever possible. The teacher who stands all day before her school, is cross and stupid in the

afternoon.

The brain cells are repaired during sleep. But it is important to note that in any one night there cannot be complete recuperation. Thirty-six hours are required for the cells to become normal after fatigue. That is, the physiological no less than the religious Sabbath extends from Saturday evening to Monday morning. Sabbath breakers are less moral, less intellectual than they would be if they observed the Sabbath. They shorten their lives by Sabbath desecration: while they live they crowd the offices of specialists in nervous diseases.

The following persons were elected to membership, subject to the rules of the Academy:—Rev. John Grueiner, St. Paul; Harlow Gale, and Geo. C. Christian, Minneapolis.

The secretary read an invitation from Josephine D. Peary, inviting the Minnesota Academy of Natural Sciences to send a naturalist on the Greenland Scientific Expedition of 1895, which expedition is being fitted out for the purpose of bringing home Mr. Peary and his assistants from northwestern Greenland where they are at present engaged in scientific observations, particularly in Meteorology. The secretary was directed to express the interest of the Academy in the enterprise and its regrets that circumstances would not permit participating in the expedition.

The secretary announced the mounting of the group of Orangs by the Ward Natural History Establishment in Rochester, N. Y., and that this group would soon be shipped to Minneapolis.

#### 225th Meeting, May 7, 1895.

Fifteen persons present: President Osborn in the chair. The St. Paul Academy of Science was again the guest of the Academy, pursuant to invitations extended.

The following program was presented:

An Observation of Ants, by O. W. Oestlund.

Remarks on Some Birds New to Minnesota, by Dr. T. S. Roberts.

An Amine compound of gold, by H. B. Hovland.

The Chemical characters of the Minnesota sandstones, by Chas P. Berkey.

A review of known facts of the Chemistry of local Sandstones.



**226th Meeting, October 15, 1895.**

Nine persons present; C. P. Berkey presiding pro tem.

L. E. Griffin was elected to membership.

Program:

A Review of the Springfield meeting of the American Association for the Advancement of Science, by Herbert W. Smith.

The Suppression of Crime, by Dr. Albert Schneider (read by Secretary Hall).

Some Geological Features of the vicinity of Franconia, Minn., by Chas. P. Berkey.

[ABSTRACT.]

Attention was called to the physiographic features at Franconia, Minn. A gorge is cut in the sedimentary series to the depth of 150 to 200 feet below the adjacent upland plain and extends westward from the St. Croix river gorge proper about half a mile. It is the lower portion of a small creek which sinks into the sand some distance above the gorge and issues as springs within the gorge itself. The gorge is considered entirely post-glacial and due to the work of the present stream supplemented by the powerful springs issuing at the lower horizons. The rock formation being composed of fine sand of the St. Croix series is readily disintegrated and easily transported by such agencies.

**227th Meeting, January 7, 1896.**

Afternoon session at 2 P. M., in the lecture room of Professor of Public Health, University of Minnesota, Engineering Building. Thirty persons present. Dr. Chas. N. Hewitt, Chairman of the Section of Sanitary Science, presided and gave an address on the qualities of good water supply for public use. The address was a resumé of the present methods of examining, in a sanitary way, a water supply. It was illustrated by a large number of cultures, by slides showing the more common mechanical impurities under the microscope, and a large number of slides to show the more common bacilli of diseases connected in a more or less direct way with drinking waters.

C. W. Hall enumerated the chief artesian basins of the northwestern states, particularly of the Dakotas, Minnesota, and Wisconsin. The conditions of successful supply were discussed, and the more pronounced chemical characters named



The evening session was held in the directors' room of the Public Library.

Public water supplies were described:

Minneapolis, by City Engineer Cappelan.

St. Cloud, by City Engineer White.

Stillwater, by Hon. E. W. Durant.

Adjourned annual meeting, Pillsbury Hall, University of Minnesota.

Reports of the secretaries were read, and ordered filed.

President, - - - - - Dr. Thomas S. Roberts.

Recording Secretary, - - - Alonzo D. Meeds.

Corresponding Secretary, - - Chas. P. Berkey.

Treasurer, - - - - - Edward C. Gale.

Trustees for three years, - { C. W. Hall.

<sup>1</sup> Herbert W. Smith.

Report of the Corresponding Secretary for the year 1895:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. ix. Rad, Nos. 18, 19.

*Agricultural College, Mich.*—Michigan Agricultural College and Exper. Station. Bulletin, Nos. 113-128.

*Albany, N. Y.*—State Library: Annual Report, 1893. Bulletin, No. 5.  
State Museum: Annual Report, 1893; Bulletin, Vol. III, Nos. 12  
and 13.

University of New York: Regents' Report, 1894.

*Angers, France.*—Académie des Sciences et Belles Lettres: *Memoirs*,  
Vol. I.

*Amiens, France.*—Société Linnéenne du Nord de la France: Bulletin.  
Vol. XII, Nos. 259-270.

*Austin, Texas.*—Texas Academy of Science: Transactions, Vol. 1.  
No. 3.

- Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 115-122.
- Belfast, Ireland.*—Natural History and Philosophical Society: Report and Proceedings, 1893-1894.
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*National, United States.*—American Association for the Advancement of Sciences, Vol. xliii.

### 229th Meeting, March 3, 1896.

Four members present.

Program:

Paper on An Exploring Expedition in the Rockies of Northwestern Montana, by Professor L. W. Chaney of Carlton College, Northfield.

Short talk on Geological Excursions and Field Work in a German University, by F. W. Sardeson.

Some notes on analyses of clays were given by C. P. Berkey.

### 230th Meeting, December 8, 1896.

Fifteen persons present; President Dr. Thos. S. Roberts presiding.

The secretary was directed to send a vote of thanks to Dr. Dunsmoor for the present of the vertebra of a whale.

Professor Hall spoke of the death of Verdine Truesdell, a member of the Board of Trustees; a committee was appointed to draw up resolutions.

Prof. Winchell brought up the matter of establishing a state academy of natural sciences to receive some support from the state, and suggested the advisability of making the Minnesota Academy the state academy.

Mr. H. C. Hanke suggested that action should be taken by the Academy recommending to the Legislature some change in the game laws in order more fully to protect the game of the state. Mr. Hanke and the President were appointed a committee to investigate and report to the Academy.

Program:

Some Features in the Geology of Northeastern Minnesota, by Prof. N. H. Winchell.

[ABSTRACT.]

The features noted in detail related to; (1) *The nature of the transition from the crystalline schists to the Laurentian.* After the description of the field facts to be observed on the dull point in Vermillion lake which embraces the corners of sections 13, 14, 21 and 32, T 63-17, the author concluded that the transition from the crystalline schists to the igneous and granite was of the nature of a gradual conformable change accompanied by silicification, and by a change of the schists themselves to gneisses, in the first place, and finally to granite by hydro-thermal fusion, and that the granitic rock penetrated the schists by generation in them of granitic minerals, in the first place, and later, or nearer the seat of greater heat, by actual intrusion in a molten form. (2) *The nature of the relations of the Stuntz conglomerate of Vermillion lake.* The author stated that evidence was discovered in a late excursion to Vermillion lake to demonstrate that this rock is a true conglomerate and not a breccia. It graduates into a quartzite and into a graywacke and the graywacke into argillaceous slate, these latter, constituting with the conglomerate, an upper formation non-conformable on the Vermillion iron-bearing formation. (3) *The nature and the position of the conglomerate in the Puckwunge valley.* This is composed of quartz pebbles, essentially, which are referable to the Animikie, some of them being composed of cryptocrystalline silica like that in the rock taconyte, and as a formation it lies above a peculiar greenish graywacke (named the Puckwunge slate) and is overlain by trap and amygdaloidal rock resembling the Keweenawan traps. It was found that this conglomerate constitutes the base of an important part of the Keweenawan, or separates the Keweenawan into two great members.



\* (This paper is printed in full in the *American Geologist* for July, 1897.)

Notes on Saganaga Granite, by U. S. Grant.

The August meeting of the American Association for the Advancement of Science, by Prof. C. W. Hall.

### 231st Meeting, January 5, 1897.

#### ANNUAL MEETING.

Nine persons present; Vice President Grant in the chair. Claude Hafer was elected a member of the Academy.

The Secretary reported \$64 collected.

The Corresponding Secretary reported the library accessions as 272 domestic and 399 foreign, total of 672, as follows:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. x. Rad, Vol. xx.

*Agricultural College, Mich.*—Michigan Agricultural College and Exp. Station. Bulletin, Nos. 129-134.

*Albany, N. Y.*—State Library: Annual Report, 1894; Bulletin, No. 6. State Museum: Annual Report, 1894; Entomologists' Report, Vol. x; Bulletin, Vol. III, Nos. 14-15.

University of N. Y.: Regents' Report, 1895.

*Amiens, France.*—Société Linnéenne du Nord: Bulletin, Vol. XII, No. 271; XIII: 272-282.

*Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 123-127.

*Berlin, Germany.*—R. Friedländer und Sohn: Naturæ novitates, 1895: 19-24; 1896: 1-19.

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*Bologna, Italy.*—Accademia delle Scienze dell' Instituto di Bologna. Memorie, Vol. IV.

*Bombay, India.*—Asiatic Society: Journal, Vol. XIX, No. 52

*Bône, Algeria.*—Académie d' Hippone: Comptes Rendus, 1895; Bulletin, No. 27.

*Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vols. XXX, XXXI.

*Boston, Mass.*—Boston Society of Natural History: Proceedings, Vol. XXVII.

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*Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen, Vol. XIII, No. 3.

*Brisbane, Queensland.*—Geological Survey of Queensland: Annual Progress, 1895; Bulletin, Nos. 3, 4; Water Supply, 1890, 1891, 1894.

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- Brünn, Austria.*—Naturforschender Verein: Bericht, 1893; Verhandlungen, 1895.
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- Cambridge, Mass.*—Harvard College Observatory: Annals, Vol. XXXIV: 1; Annual Report, 1895.
- Cambridge, Mass.*—Museum of Comparative Zoology: Annual Report, 1894-1895; Bulletin, Vols. XXIX, XXX.
- Cape Town, Africa.*—South African Philosophical Society: Transactions, Vol. VIII: 2.
- Cardiff, England.*—Naturalists' Society: Report and Transactions, Vol. XXVIII.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos. 41-47.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. XII.
- Cherbourg, France.*—Société Nationale des Sciences Naturelles: Memoirs, Vol. XXIX.
- Chicago, Ill.*—Chicago Academy of Sciences: Annual Report, Vol. XXXVIII.
- Chicago, Ill.*—Field Columbian Museum: Publications, Nos. 7-11.
- Chicago, Ill.*—Journal of Geology: Vol. IV, 1896.
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- Chur, Switzerland.*—Naturforschende Gesellschaft Graubündens. Jahresbericht, Vols. XXXIX, XL.
- Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vols. XVIII: 3, 4; XIX: 1.
- Colorado Springs, Col.*—Colorado College. Studies, Vol. VI.
- Denver, Col.*—Colorado Scientific Society: Uranite in Colorado; Pearceite; San Miguel Formation; Concretions, etc.
- Ekaterinburg, Russia.*—Société Ouralienne des Amis des Sciences: Bulletin, Vols. XIV: 1-4; XV: 1, 2.



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- Glasgow, Scotland.*—Natural History Society of Glasgow: *Proceedings and Transactions*, Vol. iv, Nos. 2, 3.
- Görlitz, Germany.*—Naturforschende Gesellschaft: *Abhandlungen*, Vol. XXI.
- Graz, Austria.*—Naturwissenschaftlicher Verein: *Mitteilungen*, Vol. XXXII.
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- Harlem, Netherlands.*—Museum Teyler: *Archives*, Vol. v: 1, 2.
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- Jefferson City, Mo.*—Geological Survey of Missouri: *Report*, Vols. VIII, IX.
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- Krakowie, Austria.*—Akademie der Wissenschaften: *Rosprawy*, Vols. VII, IX.
- Landshut, Germany.*—Botanischer Verein: *Bericht*, Vol. xiv.
- Lansing, Mich.*—State Agricultural College: *Bulletin Exp. Station*, Nos. 131-134.
- Lawrence, Kans.*—Kansas State University: *Quarterly*, Vol. v.
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- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Bi-hang, Vol. xx; Oefversigt, 1895.
- Thorn, Germany.*—Copernicus Verein für Wissenschaft und Kunst: Jahresbericht, Vols. xxxvi-xlii.
- Tokio, Japan.*—Deutsche Gesellschaft für Natur und Völkerkunde: Mitteilungen, Vol. vi, No. 57; Suppl. 3.
- Torino, Italy.*—R. Museo Zoologico di Torino: Bulletin, Vol. x: 211-221.
- Toronto, Canada.*—Canadian Institut: Transactions, Vol. iv: 2.
- Toulouse, France.*—Académie des Sciences de Toulouse: Memoires, Vol. vii.
- Toulouse, France.*—Société Française de Botanique: Revue, Vol. xii.
- Upsala, Sweden.*—Geological Institute University of Upsala: Bulletin, Vols. i. ii.
- Urbana, Ill.*—Illinois State Laboratory of Natural History: Bulletin, Vol. iii: pp. 483-501; Index; iv: p. 149-398.
- Washington, D. C.*—United States Geological Survey: Bulletin, Nos. 123-126, 128, 129, 131-134.
- Washington, D. C.*—National Museum: Bulletin, Nos. 39, I. J. K, H; 48. Proceedings, Vols. xvii, xviii. Oceanic Ichthyology.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. lxxiii: 13, 14; 74-78.
- Washington, D. C.*—Smithsonian Institution: Annual Report, 1893.
- Washington, D. C.*—Weather Bureau: Monthly Weather Review, 1895-1896.
- Wiesbaden, Germany.*—Naturhistorische Verein: Jahrbuch, Vols. xlviii, xlix.

*Zwickau, Germany.*—Verein für Naturkunde: Jahresbericht, 1894.

Australian Association for the Advancement of Science, Report, Vol. vi.

Trustee for unfinished term, { Edward C. Gale.  
of N. Truesdell, - - - }

C. W. Hall,  
U. S. Grant,  
A. D. Meeds,  
Committee.

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pointed: Prof. N. H. Winchell, T. B. Walker, Dr. T. S. Roberts, and H. W. Smith.

Professor Hall announced that at the next annual meeting the Academy will have been in existence a quarter of a century; it was carried that a committee should be appointed for the proper celebration of the anniversary.

**232d Meeting, February 2, 1897.**

Eleven persons present; President Winchell in the chair.

Hon. Frank Ives of Crookston was elected to membership.

The committee on a state academy reported some progress, and, as it needed some legal advice, E. C. Gale was added to the committee.

Program:

Revision of Moraines North of Lake Superior, by A. H. Elftman.

Glacial Lakes of St. Louis and Nemadji, by Prof. N. H. Winchell.

[ABSTRACT.]

At the extreme western end of Lake Superior are beaches showing that that lake has been at higher levels and that it left distinct traces of itself. The first lake formed by the damming of the St. Louis river by the ice of the Lake Superior glacial lobe was a small lake wholly confined within Carlton county, about 523 feet higher than the present level of Lake Superior. It had its outlet to the southward, uniting with the waters of the St. Croix and thence reached the Mississippi river. Lake Nemadji was due to the same agent and was the first lake water, the residuum of which remains to the present as a constituent part of the area of Lake Superior. This lake covered, in general, the valley of the Nemadji river and its level was 468 feet above the present level of Lake Superior. Its outlet was in secs. 16 and 17, T. 46, R. 18.

These glacial lakes are described in Vol. 4 of the Final Report of the Geological Survey of Minnesota, pp. 18-21.

The eastern limit of Glacial Lake Agassiz, by U. S. Grant.

[ABSTRACT.]

The waters of Lake Agassiz are thought to have extended eastward so as to include the area now occupied by Rainy Lake. From the fact that the lacustrine deposits of the former lake extend eastward practically only to the western edge of the latter lake, it seems probable that the extreme altitude of Lake Agassiz was in this area but a few feet.

above the present level of Rainy Lake, or that such an extreme altitude was of short duration. The shores of Rainy Lake are generally rocky, and over much of them there are practically no deposits of unconsolidated materials, the bed rock coming to the surface wherever the thin forest soil is pushed aside. At the western end of the lake this rocky surface suddenly gives way to a plain of clays, through which the bed rock rarely emerges. These clays are regarded in the main as deposits made in the waters of Lake Agassiz. The change from the rocky country on the east to this clay plain on the west is abrupt and very striking, and is intensified by a sudden change in the flora; the lake shores have a forest largely of evergreen and boreal in aspect, while to the west of the lake a forest largely deciduous and of less boreal aspect appears.

**233d Meeting, February 9, 1897.**

Six persons present; President Winchell in the chair.

Special meeting called to hear the report of the committee on a state charter. After two meetings of the committee and consultation with Judge Hicks of the Hennepin delegation it was found that the charter desired was special legislation and therefore unconstitutional. To get a state charter it would be necessary to transfer all the property of the Academy to the state, as well as to give complete control of its affairs to state officers. The committee was continued and instructed to report again.

A. D. Roe was elected to membership.

It was ordered that \$10 be expended for the purpose of preserving some of the specimens, purchase of material, etc.; and that L. E. Griffin's offer to do certain necessary work in lieu of his current dues be accepted.

Communications from E. L. Brown of Warren, touching a collection of birds and animals, and Mr. Worcester, asking for the loan of several specimens of the Philippine Island collection. The latter communication was referred to the Trustees.

**234th Meeting, March 2, 1897.**

Eight persons present; President Winchell in the chair.

The president reported for the charter committee that it had drawn up a new charter and had submitted it to Capt. Cross, who had declared it unconstitutional. The committee was continued.



Program:

Some Reported Gold Discoveries in the Northwestern States, by C. W. Hall.

Dr. U. S. Grant gave an account of the Rainy Lake gold region.

[ABSTRACT.]

Rainy Lake lies in an area of crystalline and highly folded rocks, which have been separated by Lawson into two series called Coutchiching and Keewatin. The former series consists mainly of mica-schists, while the latter consists of various slates and schists, among which greenstone schists and also massive greenstones are common. Traversing these rocks are quartz veins, some of which carry values in gold. The best veins lie either in the green schists or in other rocks of igneous origin, and the most promising prospects occur on the Canadian shores of the lake. (An account of this district has been published in the 23d Annual Report of the Geological and Natural History Survey of Minnesota, pp. 36-105, 1895, under the title "Preliminary Report on the Rainy Lake Gold Region," by H. V. Winchell and U. S. Grant; also in Vol. 4 of the Final Report of the same survey, pp. 192-211, 1899.)

C. P. Berkey read a paper on An Improved Method for Quantitative Determination of Antimony, Zinc, Iron, Copper, and Lead in an impure Galena ore.

[ABSTRACT.]

The investigation and experiences resulting in these notes arose over a particular ore brought from the Kootenai country in British Columbia. Mr. Stevenson, a special student in the laboratories of the University of Minnesota, was equally interested in them.

The ore contains from 50% to 80% metallic lead which is in the form of the natural sulphate,  $PbS$ . The impurities which make up the rest of the required amount are antimony, zinc, iron, copper and siliceous gangue matter. Antimony is the most common impurity and occurs in largest amount next to lead. It is in the form of sulphide  $Sb_2S_3$ . It was chiefly in the effort to determine this constituent that the first and greatest difficulty arose. The natural association seemed to have so thoroughly satisfied the chemical affinities that the usual methods of solution were ineffectual, and separation did not occur where it was calculated to. Iron and zinc occur in similar amount, both in sulphate form,  $FeSO_4$  and  $ZnSO_4$ . Copper is not always present in quantity of importance, but occasionally in considerable amount with iron as chalcopryrite,  $CuFeS_2$ . The siliceous gangue is present in amount varying from 0 to 15% according to quality of the ore.

The first difficulty was in securing complete solubility of the ore, the next was the almost constant failure to obtain precipitates of any

of the compounds entirely free from either lead or antimony or both.

No less than twenty different variations of process recommended by authors of texts and practical chemists were tried with no complete success. At last the following plan was devised which at least for the ore in question works with entire satisfaction.

PROCESS.

1. Digest one gram of ore in strong hydrochloric acid containing a little nitric acid, for half an hour. Then if necessary add more hydrochloric acid and about 5cc of nitric to complete the solution. Heat a few minutes and dilute. Filter and weigh residue as insoluble siliceous gangue.

2. Boil the filtrate and add enough dilute sulphuric acid to precipitate all of the lead in the form of  $PbSO_4$ . Add alcohol and allow to stand several hours, or better, evaporate till white fumes appear. Dilute cautiously, filter and weigh.

3. To the filtrate from the precipitation in (2) add ammonium chloride and ammonia in considerable excess. The precipitate contains the iron in the form of  $Fe_2O_3 \cdot H_2O$  which is filtered and ignited and weighed as  $Fe_2O_3$ .

4. Pass  $H_2S$  gas through the filtrate from (3). A grayish white precipitate of zinc,  $ZnS$ , and of copper,  $CuS$ , are formed. Filter. The filtrate contains antimony still in solution, the two mixed precipitates must be treated for separation.

5. To the filtrate from (4) add hydrochloric acid to acid reaction and  $H_2S$  gas. Antimony sulphide  $Sb_2S_3$  forms. Filter and follow the usual method of handling this precipitate.

6. Dissolve the precipitate from (4) in hydrochloric acid. To this add  $H_2S$  gas which will precipitate copper as  $CuS$ . Filter and ignite weighing as either  $Cu_2S$  or  $Cu_2O$ . (The amount of copper is the same in each.)

7. To the filtrate from (6) add ammonia to strong reaction and pass  $H_2S$  gas through. Zinc is precipitated,  $ZnS$ . Weigh as  $ZnO$ .

Analysis of the ore made after this scheme separated easily and completely, and the results checked within the usual limits of error.

The list of delinquent dues was referred to Professor Hall and Secretary Meeds.

Hon. Frank Ives of Crookston, Minn. was elected delegate of the Academy to the International Congress of Geologists to be held at St. Petersburg during the coming summer.

235th Meeting, April 5, 1897.

Twenty-one persons present.

President Winchell in the chair.

Program:



An Account of a Glacier in the Montana Rockies, by Prof. L. W. Chaney, Jr.

The Stillwater Oolite and its Fossils, by A. D. Roe.

Sketch of the Life of Verdine Truesdell.

A case was asked for the display of a collection of Indian curiosities which were offered on loan by Mrs. Leach; referred to a committee of Dr. Roberts and the secretary.

**236th Meeting, May 4, 1897.**

Six persons present.

President Winchell in the chair.

Amendment to the By-Laws, notice of which was given at the last meeting, was adopted by which the dues of resident members was reduced from \$5.00 to \$3.00 per annum.

Moved and carried that all delinquent dues up to January 1, 1897, be remitted.

Professor F. P. Leavenworth was elected to membership.

Dr. U. S. Grant read a paper on Minnesota Lakes having more than one Outlet.

[ABSTRACT.]

Among the numerous lakes in the northeastern portion of the state are several which have two outlets each. Such are: Brulé Lake in Cook County; a small lake on the International boundary between Gunflint and Saganaga lakes in Cook County; three lakes along the Kewishwi river in Lake County; Iron Lake, Lac la Croix, and Namekan lake on the International boundary on the northern edge of St. Louis County. The origin of two outlets in a lake of this class is due to inequalities of drift deposition such that a basin is left with two depressions of about equal altitude in its rim. In case of at least one of the larger lakes,—Brulé lake,—it is possible that the western outlet is of quite recent date and is due to the westward canting of the basin by the general tilting which has been taking place in the Great Lake region since near the end of Glacial time.

(This paper has been published in the *American Geologist*, Vol. 19, pp. 407-411, June, 1897, under the title "Lakes With Two Outlets in Northeastern Minnesota.")

**237th Meeting, October 5, 1897.**

Fourteen persons present.

President Winchell in the chair.

Acceptance and thanks were ordered for the gifts to the Academy of a fine Tarpon from Florida by M. B. Koon and R. R. Rand, and of a valuable collection from Mr. J. C. Eliel.

Mr. E. C. Gale moved that a committee of five, of which the President shall be chairman, be appointed to provide a fitting reception and entertainment for Dr. Nansen upon the approaching occasion of his visit to Minneapolis.

An account was given by Dr. H. T. Eddy of the meetings of the American Association for the Advancement of Science at Detroit and the British Association for the Advancement of Science at Toronto.

**238th Meeting, November 2, 1897.**

Six persons present.

President Winchell in the chair.

Dr. H. T. Eddy was elected to membership.

A paper on the Driftless Area was read by Dr. F. W. Sardeson; discussion by Warren Upham.

(See Glacial Deposits in the Driftless Area, *American Geologist*, Vol. xx, 1897, pp. 392-403).

The following committee was announced for the proper celebration of the twenty-fifth anniversary of the founding of the Academy: President N. H. Winchell, Warren Upham, H. V. Winchell, E. C. Gale, and A. D. Roe.

A public reception was held November 19, 1897, in honor of Dr. Nansen, the Arctic explorer, in the Public Library, to which the Academy's committee, President Winchell, E. C. Gale, F. W. Sardeson, H. V. Winchell, and H. T. Eddy, had sent invitations. One hundred persons were present.

**239th Meeting, December 7, 1897.**

Eleven persons present.

President Winchell in the chair.

C. M. Dorsett and Wm. Twing were elected to membership.

It was moved and carried that the committee for securing state aid for the Academy be instructed to formulate a plan fulfilling statutory requirements for bringing the Academy under control of the Board of Regents of the University, pre-



sent the same to the Regents, and report back to the Academy. Plans for the 25th anniversary were discussed.

### 240th Meeting, January 4, 1898.

#### ANNUAL MEETING.

Eight persons present.

President Winchell in the chair.

Reports of the Nansen reception and twenty-fifth anniversary committees were received.

D. T. MacDougal was elected to membership.

The Secretary reported \$81 collected from 32 persons.

The Treasurer reported \$4.64 on hand January 1, 1897, and received during 1897 \$81; total of \$85.64. Bills had been paid during the year of \$79.15, leaving a balance of \$6.49 on hand. But bills amounting to considerably more than this balance remained unpaid.

The Curator of the museum reported the condition of the museum, the effort he had made to receive and label the collections, the large number of daily visitors and the great interest shown.

Report of the Corresponding Secretary of accessions to the Library received during 1897:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. XI; Rad, Vols. XXII, XXIII.

*Agricultural College, Mich.*—Michigan Agricultural College and Exp. Station: Bulletin Nos. 135-144.

*Albany, N. Y.*—State Library: Annual Report, 1895; Bulletin, Nos. 7, 8.

State Museum: Annual Report, 1895; Bulletin.

University of New York: Regents' Report, 1896.

*Altenburg, Germany.*—Naturforschende Gesellschaft des Osterlandes: Mitteilungen, Vol. VII.

*Austin, Texas.*—Texas Academy of Science: Transactions, Vol. II: 1.

*Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 128-131.

*Belfast, Ireland.*—Natural History and Philosophical Society: Report and Proceedings, 1895-1896.

*Berlin, Germany.*—R. Friedländer und Sohn. Naturæ novitates, 1896: 20-24; 1897: 1-8.

*Bombay, India.*—Royal Asiatic Society: Journal, Vol. XIX, No. 53; Memoirs, Vols. XVI, XXVI.

- Bône, Algeria.*—Academia d' Hippone: Comptes Rendus, 1896.
- Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vol. xxxii.
- Boston, Mass.*—Horticultural Society: Transactions, 1896.
- Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen, Vol. xiv: 1.
- Brisbane, Queensland.*—Geological Survey of Queensland: Bulletin, Nos. 5, 6.
- Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, xii.
- Brünn, Austria.*—Naturforschender Verein: Bericht, Vol. 14; Verhandlungen, Vol. xxxiv.
- Bruxelles, Belgium.*—Société Belge de Microscopie: Annales, Vol. xxi. Bulletin, Vol. xxiii.
- Bruxelles, Belgium.*—Société Royale de Botanique de Belgique: Bulletin, Vols. xxxv, xxxvi.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Annales, Vols. xlii, xliii.
- Calcutta, India.*—Geological Survey of India: Memoirs, Vol. xxv; Records, Vol. xxix: 4.
- Cambridge, Mass.*—Harvard College Observatory: Annals, Vols. xxv: 2; xxxvi; xxxviii.
- Cambridge, Mass.*—Museum of Comparative Zoology: Annual Report, 1897; Bulletin, Vols. xxxi: 1-5; xxxii: 1-9.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. xiii.
- Chicago, Ill.*—Chicago Academy of Sciences: Annual Report, 40th; Bulletin, Vol. ii, Nos. 1, 2.
- Chicago, Ill.*—Field Columbian Museum: Publications, Nos. 15-22; 24.
- Chicago, Ill.*—Journal of Geology: Journal, Vol. v.
- Christiania, Norway.*—Videnskabs Selskab: Förhandlinger, 1896; Skrifter, 1895.
- Cincinnati, Ohio.*—Cincinnati, Society of Natural History: Journal Vol. xix: 2, 3.
- Denver, Col.*—Colorado Scientific Society: Ferric Sulphate, etc.; Circular, No. 1.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vol. vii.
- Des Moines, Iowa.*—Iowa Academy of Science: Proceedings, Vol. iii.
- Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Sitzungsberichte, Vol. xi.
- Ekaterinburg, Russia.*—Société Ouralienne des Amis des Sciences Naturelles: Bulletin, Vols. xiv: 5; xv.; Memoirs, Vols. xiv, xv.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxxi.
- Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. xxxvi.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. xxxiii.



- Gueret, France.*—Société des Sciences Naturelles: *Memoirs*, 1895-'96.
- Guströw, Germany.*—Verein der Freunde der Naturgeschichte: *Archiv*, Vol. I.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: *Proceedings and Transactions*, Vol. ix: 2.
- Halle a<sup>d</sup> Saale, Germany.*—Kais. Leopold. Carol. Akademie. *Leopoldiana*, 1896.
- Harlem, Netherlands.*—Museum Teyler: *Archives*, Vol. v: 3, 4.
- Hermannstadt, Austria.*—Siebenburgischer Verein für Naturwissenschaften, *Verhandlungen*, Vol. xlv.
- Iowa City, Iowa.*—Iowa Historical Society: *Historical Record*, Vol. XIII.
- Kharkow, Russia.*—Société Naturalistes à l'Université: *Travaux*, Vol. xxx.
- Kjöbenhavn, Denmark.*—Naturhistoriske Forening: *Meddelelser*, 1896.
- Krakowie, Austria.*—Akademie der Wissenschaften: *Rosprawy*, Vols. x-xii.
- Lansing, Mich.*—State Agricultural College: *Bulletin Exp. Station*, Nos. 139-144.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: *Bulletin*, Vols. xxxii, xxxiii.
- Lawrence, Kans.*—Kansas State University: *Geological Survey, Reports*, Vols. I, II. *Quarterly*, Vol. vi.
- Lincoln, Neb.*—University of Nebraska: *University Studies*, Vol. II: 2.
- Liverpool, England.*—Geological Society: *Proceedings*, Vol. vii: 4.
- Manchester, England.*—Literary and Philosophical Society: *Memoirs and Proceedings*, 1896.
- Montevideo, Uruguay.*—Museo Nacional: *Annales*, Vol. II: 6, 7.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: *Bulletin*, 1896.
- Nantes, France.*—Société Académique de la Loire-Inferieure: *Annales*, Vol. vii.
- Nashville, Tenn.*—State Board of Health: *Bulletin*, Vols. xii: 5, 6; xiii: 1, 2.
- New York, N. Y.*—American Geographical Society: *Bulletin*, Vols. xxviii: 4; xxix.
- New York, N. Y.*—New York Microscopical Society: *Journal*, Vols. xiii: 4; xiv: 1.
- Oberlin, Ohio.*—Oberlin College: *Laboratory Bulletin*, Nos. 5, 6, 7, 9. *Wilson Bulletin*, Vol. iv.
- Osnabrück, Germany.*—Naturwissenschaftlicher Verein: *Jahresbericht*, 1896.
- Paris, France.*—Museum d' Histoire Naturelle: *Bulletin*, 1897.
- Philadelphia, Pa.*—Academy of Natural Sciences: *Proceedings*, 1897.
- Philadelphia, Pa.*—Zoological Society: *Annual Report*, 24, 25.
- Portland, Maine.*—Portland Society of Natural History: *Proceedings*, Vol. II: 4.
- Port Louis, Mauritius.*—Royal Alfred Observatory: *Meteorological Observations*, 1895.

- Riga, Russia.*—Naturforscherverein: Korrespondenzblatt, Vol. xxxix.
- Rovereto, Austria.*—Accademia degli Agiati in Rovereto: Atti, Vol. II: 4.
- Sacramento, Cal.*—California State Mining Bureau: Report, Vol. XIII; Bulletin, Nos. XI, XII.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: Bericht, 1894-1895.
- St. John's, New Brunswick.*—Natural History Society: Bulletin, Vol. XIV.
- Saint-lô, France.*—Société d' Agriculture et d' Histoire Naturelle de la Manche. Memoirs et Docum, Vol. XIV.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vol. VII.
- St. Louis, Mo.*—St. Louis Academy of Science: Transactions, Vol. VII: 10-16.
- St. Paul, Minn.*—Minnesota Historical Society: Historical Collections, Vol. VII: 1, 2.
- Sankt Peterburg, Russia.*—Imp. Academy of Sciences: Bulletin, Vol. IV.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vol. XV: 3-5; Memoirs, Vols. XIV: 2, 4; XV: 2.
- Sankt Peterburg, Russia.*—Société Imp. Mineralogique: Verhandlungen, 1895.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vol. VI; New Ser., Vol. I: 1-3.
- Sydney, New South Wales.*—Geological Survey of New South Wales: Annual Report, 1896; Records, Vol. V: 1.
- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Bihang, Vol. XXI; Oversight, 1896.
- Topeka, Kans.*—Kansas Academy of Sciences: Transactions, Vol. XIV.
- Torino, Italy.*—Museo Zoologico di Torino: Bulletin, Vol. XI.
- Toronto, Canada.*—Canadian Institute: Proceedings, Nos. 1, 2; Transactions, Vol. V: 1.
- Toulouse, France.*—Société Française de Botanique: Revue, Vol. XIII.
- Urbana, Ill.*—Illinois State Laboratory of Natural History: Bulletin, Vol. V: 1, 2, 5.
- Washington, D. C.*—Bureau of American Ethnology: Annual Report, Vol. XIV, XV.
- Washington, D. C.*—United States Geological Survey: Annual Report, Vols. XVI, XVII; Bulletin, Nos. 87, 127, 130, 135, 136, 138-148. Monographs, Vols. XXIII, XXV-XXVIII.
- Washington, D. C.*—United States National Museum: Bulletin, Vol. XLIX; Proceedings, Vol. XIX.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. LXXIX-LXXXI.
- Washington, D. C.*—Weather Bureau: Monthly Weather Review, 1897.
- Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrschrift, Vols. XLI: 3, 4; XLII: 1, 2.



Officers elected as follows:

President, - - - - - Professor N. H. Winchell.

Vice President, - - - - - Dr. D. T. MacDougal.

Recording Secretary, - - - - - A. D. Roe.

Corresponding Secretary, - - - C. P. Berkey.

Treasurer, - - - - - E. C. Gale.

Trustees for three years, -  $\left. \begin{array}{l} \text{E. C. Gale.} \\ \text{C. P. Berkey.} \end{array} \right\}$

Trustee to succeed H. W. Smith Dr. H. T. Eddy.

#### 241st Meeting, April 5, 1898.

Nine persons present.

Vice President MacDougal presiding.

G. B. Aiton, U. S. Cox, and C. E. Bond were elected to membership.

A box of specimens and a letter from Hon. Frank Ives, with promise of his report as delegate to the International Congress of Geologists at St. Petersburg, was duly received and ordered acknowledged.

The following amendment to Section I, Article I of the By-Laws, duly announced at the last meeting, was adopted. "The annual meeting of the Academy shall be held on the first Tuesday after the first Monday in January. The regular meetings of the Academy shall be held on the first Tuesday after the first Monday in the months of January, April and October in each year. Five members shall constitute a quorum."

The invitation of the Mankato Board of Trade to hold a special meeting of the Academy in that city was accepted; a committee, Drs. MacDougal and Sardeson, was empowered to use what money was necessary up to \$25, for incidental expenses.

#### 242d Meeting, January 3, 1899.

##### ANNUAL MEETING.

Twelve persons present; Vice President MacDougall presided.

The following were elected to membership:

Dr. J. K. Hosmer and F. J. Warvelle of Minneapolis.

Oscar Halvorson, Two Harbors.

H. F. Burchard, St. Paul.

The reports of the Secretary and Treasurer showed a balance in the treasury at the beginning of the year of \$6.49, receipts \$64.92; disbursements \$65.91. Balance now in treasury, \$5.51 with no debts.

The report of the Corresponding Secretary was omitted. (See pages 221-7).

Officers were elected as follows:

President, - - - - -	Prof. D. T. MacDougal.
Vice President, - - - - -	O. W. Oestlund.
Recording Secretary, - - -	A. D. Roe.
Corresponding Secretary, - -	C. P. Berkey.
Treasurer, - - - - -	E. C. Gale.
Trustees for three years, -	{ C. W. Hall. H. T. Eddy.

Program: Terrace Gravels about St. Anthony Falls, by F. W. Sardeson.

[ABSTRACT.]

The occurrence of terraces younger than the Glacial drift and older than St. Anthony falls and gorge of the Mississippi river was indicated with considerable detail. In particular a terrace gravel containing shells of mollusks 100 feet above the present level of the river below the falls was described and specimens were exhibited. This occurrence has been described by Hall and Sardeson, Bulletin Geological Society Am. Vol. x, p. 358 and Fig. 2, November, 1899.

Unusual Occurrences of Copper in Minnesota, by C. P. Berkey.

Antennal Sense Organs of the Aphididae, by O. W. Oestlund.

[ABSTRACT.]

Attention was called to the great variety of sense organs on the antennæ of the Aphididæ, and their value for distinguishing species. The most conspicuous are the so called sensoria, small membranous areas scattered over the surface. Of these three distinct types may be distinguished: 1. *Apical Sensoria*, a single large sensoria close to the apex of the fifth and the sixth joints. The first to appear in the larva and the most constant sensoria present. 2. *Marginal Sensoria*, a group of very small sensoria near the margin of the apical



sensoria of the sixth joint. 3. *Circular Sensoria*, more or less scattered over the surface of the third and sometimes also on the fourth and fifth joints. The circular sensoria show considerable variation in the different genera, and may be transverse, annulate, tuberculate, etc.

The hairs of the antennae are also undoubtedly sense organs, of which several different forms may be distinguished: 1. A group of short spine-like hairs on the apex of the spur, (the narrow prolongation of the sixth joint). 2. Hairs scattered over the surface of the antennæ, long and slender in *Lachnus Chaitophorus*, etc.; short and spine-like in *Aphis*; club-shaped in *Nectarophora*.

A Mineral Resembling Meerschaum, from the Serpentine Range of Hampden County, Mass., by A. D. Roe. [See paper J.]

The Sugar Beet Industry at St. Louis Park, by C. C. Hafer.

#### 243d Meeting, April 4, 1899.

Eleven present; President MacDougal in the chair.

John Skinner elected to membership.

A committee, Dr. J. K. Hosmer, Dr. F. W. Sardeson, and A. D. Roe, was appointed to consider paying a curator of the Academy museum.

The President reported informally on the proposition of the Omaha Exposition corporation for the mounting, exhibition, and subsequent return to the Academy at this city of the Menage Philippine Expedition material stored at the State University buildings.

Brief papers were read by Dr. F. W. Sardeson and Dr. U. S. Grant.

#### 244th Meeting, October 3, 1899.

President Oestlund in the chair.

Ten persons present.

The disposition of the collections of the Menage Expedition to the Philippine Islands on their return from Omaha, was considered. A committee was appointed, consisting of Messrs. Roe, Winchell and Burchard.

The following program of papers was presented:

A Theory of the Origin of Copper in the Lake Superior district, by C. P. Berkey.

River Collecting of Zoological Material, by J. E. Guthrie.

The chairman was authorized to arrange for a series of popular meetings.

**245th Meeting, January 2, 1900.**

ANNUAL MEETING.

Ten persons present.

The Secretary presided.

Dr. C. P. Berkey gave a lecture on Cripple Creek and Aspen; their Geology, Mining, History, and Scenery.

[ABSTRACT.]

The paper presented was the result of a trip to these camps as a member of the field expedition of the School of Mines of the University of Minnesota. The geologic structure of each camp was outlined, its history as a producing camp was sketched, and these features together with the magnificent scenery of these mountainous districts was illustrated by a series of photographs and lantern slides. A series of the characteristic ores and rock types of the districts was exhibited.

**246th Meeting, February 5, 1900.**

ADJOURNED ANNUAL MEETING.

Room 21 Pillsbury Hall.

Six persons present.

Vice President Oestlund presiding.

The Recording Secretary reported \$57 dues collected.

A. D. Roe, elected curator by the board of trustees, reported that the Philippine exhibit was opened at the Academy Museum on Nov. 5, 1899, with an admission fee of ten cents, children under 12, five cents, and that the receipts for the nine weeks from Nov. 5, 1899, to Feb. 5, 1900, had been \$358.85. He had turned over \$280 of this to the Treasurer.

Report of the Corresponding Secretary of exchanges received for the two years, 1898 and 1899:

- Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vols. XII, XIII; Rad, Vols. XXIV, XXV.  
*Albany, N. Y.*—State Library: Annual Report, Vols. LXXIX, LXXX; Bulletin, Nos. 9-12.



- State Museum: Annual Report, Vols. L, LI; Bulletin, , Vols. IV: 16-19; V: 20-23.
- University of New York: Regents' Report, 1897, 1898.
- Amiens, France.—Société Linnéenne du Nord de la France: Bulletin, Nos. 283-302; Memoirs, Vol. IX.
- Austin, Texas.—Texas Academy of Science: Transactions, Vol. I: 4
- Baltimore, Md.—Johns Hopkins University: Circular, Nos. 132-141.
- Barcelona, Spain.—Real Academia di Ciencias y Artes: Bulletin, Vol. I: 15-23; Nomina, 1898-1899.
- Basel, Switzerland.—Naturforschende Gesellschaft: Verhandlungen, Vols. XI: 3; XII: 1.
- Belfast, Ireland.—Natural History and Philosophical Society: Report and Proceedings, 1896, 1897.
- Berlin, Germany.—R. Friedländer und Sohn. Naturæ novitates, 1897, Nos. 9-20; 1898, 1899.
- Béziers, France.—Société d' Etude des Sciences Naturelles: Bulletin, Vols. XIX, XX.
- Bologna, Italy.—Accademia delle Scienze dell' Instituto di Bologna: Memoirs, Vols. V, VI; Rendus delle Sess, Vol. I.
- Bombay, India.—Royal Asiatic Society: Journal, Vol. XX; No. 54.
- Bône, Algeria.—Académie d' Hippone: Comptes Rendus, 1897, 1898; Bulletin No. 29.
- Boston, Mass.—American Academy of Arts and Sciences: Proceedings, Vols. XXXIII, XXXIV.
- Boston, Mass.—Boston Society of Natural History: Proceedings, Vol. XXVIII.
- Boston, Mass.—Horticultural Society: Transactions, 1897, 1898.
- Bremen, Germany.—Naturwissenschaftlicher Verein: Abhandlungen, Vols. XIV: 2; XV; XVI.
- Brisbane, Queensland.—Geological Survey of Queensland: Bulletin, Nos. 8-10.
- Brisbane, Queensland.—Royal Society of Queensland: Proceedings, Vol. XIII.
- Brünn, Austria.—Naturforschender Verein: Bericht, Vols. XV, XVI; Verhandlungen, Vols. XXXV, XXXVI.
- Bruxelles, Belgium.—Société de Géologie: Bulletin, Vols. VII, VIII, IX.
- Bruxelles, Belgium.—Société Belge de Microscopie: Annales, Vols. XXII, XXIII; Bulletin, Vol. XXIV.
- Bruxelles, Belgium.—Société Malacologique de Belgique: Proces Verbal, Nos. 25-27; Bulletin, No. 34.
- Buenos Aires, Argentine.—Instituto Geographico Argentino: Bulletin, Vols. XVIII, XIX, XX: 1-6.
- Buenos Aires, Argentine.—Museo Nacional: Anales, Vols. V, VI; Com's. Vol. I: 1-3; Memores, 1894, 1895, 1896.
- Buenos Aires, Argentine.—Sociedad Cientifica Argentina: Anales, Vols. XLIV, XLVII.
- Calcutta, India.—Geological Survey of India: Memoirs, Vols. XXVII: 2; XXVIII: 1 Records.

- Cambridge, Mass.*—Museum of Comparative Zoology: Annual Report, 1898, 1899; Bulletin, Vols. xxxii-xxxv.
- Cape Town, South Africa.*—South African Philosophical Society: Transactions, Vols. ix, x.
- Cardiff, England.*—Naturalists' Society: Report and Transactions, Vols. xxix, xxx.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos. 48-59.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vols. xiv, xv.
- Chicago, Ill.*—Field Columbian Museum: Annual Report, 1897, 1898; Birds of Eastern N. America, Part 1; Publications, Nos. 25, 33-43, 46-50.
- Chicago, Ill.*—John Crerar Library: Annual Report, 4th.
- Chicago, Ill.*—Journal of Geology: Journal, Vols. vi, vii.
- Christiania, Norway.*—Videnskabs Selskab: Förhandlingar, 1897, 1898; Oversigt, 1898; Skrifter, 1896, 1897, 1898.
- Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vol. xix: 4.
- Denver, Col.*—Colorado Scientific Society: Bulletin, Nos. 3, 4.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vols. viii, ix.
- Des Moines, Iowa.*—Iowa Academy of Sciences: Proceedings, Vols. iv, v.
- Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Sitzungsberichte, Vol. xii: 1.
- Ekaterinburg, Russia.*—Société Ouralienne des Amis des Sciences Naturelles: Bulletin, Vols. xvi, xvii, xviii, xix.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxxii; Kleine Schriften, Vol. xix.
- Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 280-331.
- Frankfurt a d Oder, Germany.*—Naturwissenschaftlicher Verein, Helios, Vols. xiv, xv, xvi; Societatum Litteræ, Vols. xi, xii, xiii.
- Genève, Switzerland.*—Société de Géographie: Bulletin, 1898; Le Globe, Vols. xxxvii, xxxviii.
- Georgetown, British Guiana.*—Royal Agricultural and Commerical Society: Journal, Vol. xi.
- Glasgow, Scotland.*—Natural History Society of Glasgow: Proceedings, Vol. v: 1, 2.
- Görlitz, Germany.*—Naturforschende Gesellschaft: Abhandlungen, Vol. xxii.
- Granville, Ohio.*—Denison University: Bulletin, Vols. viii, ix, x; xi: 1-8.
- Greifswald, Germany.*—Naturwissenschaftlicher Verein: Mitteilungen, Vols. xxviii, xxix.
- Guéret, France.*—Société des Sciences Naturelles de la Creuse: Mémoires, 1897, 1898.



- Guströw, Germany.*—Verein der Freunde der Naturgeschichte: Archiv, Vols. LI, LII.
- Habana, Cuba.*—Academia di Ciencias: Anales, Vols. xxxv, xxxvi, Nos. 418-420.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proceedings, Vol. xix: 3, 4.
- Halle a d Saale, Germany.*—Kais. Leopold. Carol. Akademie. Nova Acta, Vols. Lxx: 3; Lxxi: 9; Leopoldiana, 1898.
- Hannover, Germany.*—Naturhistorische Gesellschaft: Jahresbericht, Vols. XLIV-XLVII.
- Harlem, Netherlands.*—Musée Teyler: Archives, Vol. vi: 1-6.
- Innsbruck, Austria.*—Naturwissenschaftlich-Medizinischer Verein: Bericht, Vol. xxiii, xxiv.
- Iowa City, Iowa.*—Iowa Historical Society: History of Iowa, Vol. II; Records, Vols. xiv, xv.
- Kassel, Germany.*—Verein für Naturkunde: Abhandlungen, Vols. XLII, XLIII.
- Kharkow, Russia.*—Société Naturalistes a l' Université: Travaux, Vol. XXXI.
- Kiel, Germany.*—Naturwissenschaftlicher Verein: Schriften, Vol. xi, No. 1.
- Kjöbenhavn, Denmark.*—Naturhistorike Förening: Meddelelser, 1897, 1898.
- Krakowie, Austria.*—Akademie der Wissenschaften: Rosprawy, Vols. XIII, XIV.
- Landshut, Germany.*—Botanischer Verein: Bericht, Vol. xv.
- Lansing, Mich.*—State Agricultural College: Bulletin Exper. Station, Nos. 145-168.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vol. xxxiv.
- Lawrence, Kans.*—Kansas State University: Quarterly, Vols. vii, viii; Bulletin, Vol. i: 1-3.
- Liège, Belgium.*—Société Géologique de Belgique: Annales, Vols. xxii, xxiii, xxiv, xv.
- Liverpool, England.*—Geological Society: Proceedings, Vol. viii: 1, 2.
- Lüneberg, Germany.*—Naturwissenschaftlicher Verein: Jahresbericht, Vol. xiv.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs and Proceedings, Vols. xlii: xliii: 1-4.
- Melbourne, Victoria.*—Public Libray, Museum and National Gallery: Reports, 1896-1897.
- Milano, Italy.*—Società Italiana di Scienze Naturali: Atti, Vol. xxxvii.
- Milwaukee, Wis.*—Public Museum: Annual Report, Vols. xv, xvi.
- Montevideo, Uruguay.*—Museo Nacional Anales, Vols. II: 8-11; III: 9-10.
- Montreal, Canada.*—Canadian Record of Science: Vols. vii: 6, 7, 8; viii: 1.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin, Vols. 1897: 1-4; 1898.

- Nantes, France.*—Société Académique de la Loire-Inferieure: *Annales*, Vol. VIII.
- Neuchâtel, Switzerland.*—Société des Sciences Naturelles: *Bulletin*, Vols. XXI-XXV.
- New York, N. Y.*—American Geographical Society: *Bulletin*, Vols. XXX, XXXI.
- New York, N. Y.*—American Museum of Natural History: *Bulletin*, Vols. X, XI.
- New York, N. Y.*—Linnean Society: *Abstracts*, Nos. 8-11.
- Nürnberg, Germany.*—Naturhistorische Gesellschaft: *Abhandlungen*, Vol. XI.
- Oberlin, Ohio.*—Oberlin College: *Wilson Bulletin*, Vols. V; VI: 1-4; *Library Bulletin*, No. 4.
- Osnabrück, Germany.*—Naturwissenschaftlicher Verein: *Jahresbericht*, 1897, 1898.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: *Annual Report*, Vols. VIII and XIX, with maps.
- Padova, Italy.*—Società Veneto-Trentina di Scienze Naturali: *Atti*, Vol. III: 2; *Bulletin*, VI: 3.
- Paris, France.*—Museum d' Histoire Naturelle: *Bulletin*, 1898, 1899.
- Penzance, England.*—Royal Geological Society of Cornwall: *Transactions*, Vol. XII: 4.
- Philadelphia, Pa.*—Academy of Natural Sciences: *Proceedings*, Vols. 1898, 1899.
- Philadelphia, Pa.*—Wagner Free Institut of Science: *Transactions*, Vol. III: 4.
- Philadelphia, Pa.*—Zoological Society of Philadelphia: *Annual Report*, Vols. XXVI, XXVII.
- Pisa, Italy.*—Società Toscana di Scienze Naturali: *Atti*, Vol. XI.
- Port Louis, Mauritius.*—Royal Alfred Observatory: *Annual Report*, 1896, 1897.
- Prag, Bohemia.*—Böhmische Gesellschaft der Wissenschaften: *Jahresbericht*, 1896-1898; *Sitzungsberichte*, 1896-1898.
- Reichenberg, Bohemia.*—Verein der Naturfreunde: *Mitteilungen*, Vols. XXVII-XXX.
- Rovereto, Austria.*—Accademia degli Aglati in Rovereto: *Atti*, Vols. III, IV, V: 1-2.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: *Bericht*, 1896, 1897.
- St. John's, New Brunswick.*—Natural History Society: *Bulletin*, Vols. XVI, XVII.
- Saint-lô, France.*—Société d' Agriculture et d' Histoire Naturelle de la Manche: *Memoirs & Docum.*, Vols. XV, XVI.
- St. Louis, Mo.*—Missouri Botanical Garden: *Annual Report*, Vols. VIII, IX.
- St. Louis, Mo.*—St. Louis Academy of Science: *Transactions*, Vols. VII: 17-20; VIII; IX: 1-4.



- St. Paul, Minn.*—Minnesota Historical Society: Biennial Report, Vol. x.
- Sankt Peterburg, Russia.*—Imperial Academy of Sciences: Bulletin, Vols. v, vi; Memoirs, Vol. iv: 3.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vols. xv, xvi; Memoirs, Vol. xvi: 1.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vol. i: 4, 5, 6, 11, 12; Occasional Papers, Vol. vi.
- Santiago, Chile.*—Société Scientifique du Chile: Actes, Vol. vii: 2, 3, 4.
- Sydney, New South Wales.*—Australian Museum: Report, 1897, 1898; Records, Vol. iii: 3-5.
- Stavanger, Norway.*—Stavanger Museum: Aarsberetning, 1898-1899.
- Stockholm, Sweden.*—Geologiska Byron: Afhandlingar, Nos. C. 160-182.
- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Bihang, Vols. xxii-xxiv; Ofversigt, 1897, 1898.
- Sydney, New South Wales.*—Geological Survey of New South Wales: Annual Report, 1897, 1898; Mineral Resources, Nos. 5, 6; Records, Vols. vi: 2, 3; vii: 1.
- Sydney, New South Wales.*—Royal Society: Journal and Proceedings, Vols. xxx, xxxi, xxxii.
- Thorn, Germany.*—Copernicus Verein für Wissenschaft und Kunst: Jahresbericht, 1897; Mitteilungen, Vols. x-xii.
- Tokio, Japan.*—Deutsche Gesellschaft für Natur und Völkerkunde: Mitteilungen, Vol. vi, Nos. 58-60.
- Torino, Italy.*—Museo Zoologico di Torino: Bulletin, Vols. xii, xiii.
- Toronto, Canada.*—Canadian Institut: Proceedings, Vols. i: 6; ii: 1, 2; Transactions, Vol. v: 2.
- Toulouse, France.*—Académie des Sciences: Memoirs, Vols. viii, ix; Bulletin, Vol. i.
- Upsala, Sweden.*—Geological Institute University of Upsala: Bulletin, Vols. iii, iv: 1.
- Urbana, Ill.*—Illinois State Laboratory of Natural History: Bulletin, Vol. v: 4, 5.
- Washington, D. C.*—United States Geological Survey: Annual Report, Vol. xviii; Bulletin, Nos. 51, 88, 89, 149; Monographs, Vols. xxix, xxx, xxxi, xxxv.
- Washington, D. C.*—United States National Museum: Bulletin, Vol. xlvii: 2, 3; Proceedings, Vols. xx, xxi.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. lxxxii-lxxxviii.
- Washington, D. C.*—Smithsonian Institution: Annual Report, 1896-1897.
- Washington, D. C.*—United States Weather Bureau: Monthly Weather Review, Vols. xxvi, xxvii.
- Winnipeg, Manitoba.*—Manitoba Historical and Scientific Society: Annual Report, 1896-1898; Transactions, Vol. xlix, liv.
- Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrsschrift, Vols. xliii: 3, 4; xliii; xliiv: 1, 2.

Zwickau, Germany.—Verein für Naturkunde: Jahresbericht, 1895, 1896.

American Association for the Advancement of Sciences: Proceedings,  
Vols. XLVI, XLVII.

Election of officers:

President, - - - - -	Dr. H. T. Eddy.*
Vice President, - - - - -	O. W. Oestlund.
Recording Secretary, - - -	F. G. Warville.
Corresponding Secretary, - -	C. P. Berkey.
Treasurer, - - - - -	E. C. Gale.
Trustees for three years, -	{ Dr. J. K. Hosmer. A. D. Roe.

247th Meeting, April 8, 1900.

Thirty-two persons present.

Vice President Oestlund in the chair.

Dr. Berkey reported that material had been sent to the Duluth Scientific Association and Moorhead Normal School.

Curator Roe reported that free Saturday admission to the museum had reduced receipts, but that March still gave a profit of \$16.

H. W. Howling, Wm. Kilgore, Alfred Humphrey, J. H. Gill, and Paul M. Glasoe were elected to membership.

Program:

The Bad Lands of Wyoming, by F. W. Sardeson, illustrated by original photographs taken by his expedition of last year to Big Horn county.

Personal Observations on Ants, by O. W. Oestlund.

[ABSTRACT.]

An account of an observation on ants was given that seems to be exceptional, or at least not recorded by any student on the habits of ants as far as can be ascertained by the author.

A nest found on a burnt-over place on the border of the woods had a space of smooth and hard ground around it, about a foot in diameter, free from grass or any vegetation. The whole colony, of 150

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\*Dr. Eddy declined to serve as President of the Academy and Vice President Oestlund was Acting President for the year.—EDITOR.



to 200 individuals, was apparently above ground on the open space. The ants showed great excitement and were running about in all directions. Their actions appeared at first to be aimless, due to fear, danger or some other cause that had thrown the whole colony in commotion. But on closer observation it was seen that when two of them met they would clasp antennæ and forelegs and rise up on the hind legs, would swing around two or three times, on which they would separate, each one going in search for a new partner to repeat the same action.

The interpretation given to this unusual procedure was that the ants were at play, or, to express it as man would, they had a dance.

#### **248th Meeting, October 2, 1900.**

Ten persons present.

Vice President Oestlund presided.

Program:

The Geology of the Pembina Mountains, by C. P. Berkey, with specimens of brick made from their sand.

Glacial Plowing in the Vicinity of Minneapolis, by F. W. Sardeson.

#### **[ABSTRACT.]**

This paper is based on a series of observations made during excavation of Glacial drift. The results to date were shown by aid of photographs. This paper with drawings instead of reproduced photographic illustrations has been published elsewhere. ("A Particular Case of Glacial Erosion," *The Journal of Geology*, Vol. XIII, No. 4, p. 351-357, May-June, 1905.)

#### **249th Meeting, November 13, 1900.**

Thirteen present.

Vice President Oestlund presiding.

Program: Surface Features of Minnesota, by C. W. Hall.

#### **250th Meeting, December 4, 1900.**

About fifteen present.

Vice President Oestlund presiding.

Program:

A demonstration of original micro-photographs as lantern slides, showing the late progress in finer anatomy and in the physiology of the brain, by Harlow Gale.

251st Meeting, January 8, 1901.

ANNUAL MEETING.

Twelve present.

Vice President Oestlund presiding.

Corresponding Secretary Berkey reported the year's accessions to the library as 371 domestic and 417 foreign publications.

List of exchanges received during the year 1900:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. xiv; Rad, No. 140.

*Agricultural College, Mich.*—Agricultural College and Exp. Station: Bulletin, Nos. 166-181. Annual Report, 37, 38.

*Albany, N. Y.*—State Library: Annual Report, 1899.

State Museum: Bulletin, Vols. v: 24, 25; vi: 26-34.

University of New York: Regents' Report, 1899.

*Amiens, France.*—Société Linnéenne du Nord de la France: Bulletin, Vol. xiv, Nos. 303-322.

*Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 142-149.

*Bamberg, Germany.*—Naturforschende Gesellschaft: Bericht, Vol. xvii.

*Barcelona, Spain.*—Real Academia de Ciencias y Artes: Bulletin, Vol. i: 24-26.

*Basel, Switzerland.*—Naturforschende Gesellschaft: Verhandlungen, Vol. xii: 2, 3.

*Belfast, Ireland.*—Natural History and Philosophical Society: Report and Proceedings, 1898-1899.

*Berlin, Germany.*—R. Friedländer und Sohn: Naturæ Novitates, Vol. xxii.

*Béziers, France.*—Société d' Etude des Sciences Naturelles: Bulletin, Vol. xxi.

*Bologna, Italy.*—Accademia delle Scienze dell' Istituto di Bologna: Memoirs, Vol. vii; Rendiconto, Vols. ii, iii.

*Bombay, India.*—Royal Asiatic Society: Journal, Vol. xx, No. 55.

*Bône, Algeria.*—Académie d' Hippone: Comptes Rendus, 1899.

*Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vol. xxxv.

*Boston, Mass.*—Boston Society of Natural History: Proceedings, Vol. xxix.

*Boston, Mass.*—Horticultural Society: Transactions, 1899.

*Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, Vols. xiv, xv.

*Brünn, Austria.*—Naturforschender Verein: Bericht, Vol. xvii; Verhandlungen, Vol. xxxvii.

*Bruzelles, Belgium.*—Société de Microscopie: Annales, Vols. xxiv, xiii.



- Bruxelles, Belgium.*—Société de Microscopie: Annales, Vols. xxiv, xxv; Bulletin, Vol. xxv.
- Bruxelles, Belgium.*—Société Royale de Botanique de Belgique: Bulletin, Vols. xxxvii, xxxviii.
- Buenos Aires, Argentine.*—Museo Nacional: Com's. Vol. 1: 4-6.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Anales, Vols. xlviii, xlix.
- Calcutta, India.*—Geological Survey of India: Report, 1899; Record, Vol. xxix; 1; Memoirs, Vols. xxix, xxx: 1-3; N. S., Vol. 1.
- Cambridge, Mass.*—Harvard College Observatory: Annals, Vols. xxxii: 2, xxxiii; Report, 1899.
- Cambridge, Mass.*—Museum of Comparative Zoology: Vols. xxxvi: 7, 8; xxxvii: 1, 2; xxxviii: 1.
- Cape Town, South Africa.*—South African Philosophical Society: Transactions, Vol. xi: 1.
- Cardiff, England.*—Naturalists' Society: Report and Transactions, Vol. xxxi.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos. 60-63.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. xvi.
- Chemnitz, Germany.*—Naturwissenschaftlicher Gesellschaft: Bericht, Vol. xiv.
- Chicago, Ill.*—Botanical Gazette: Vols. xxviii, xxix, xxx.
- Chicago, Ill.*—Chicago Academy of Sciences: Report, Vol. xl; Bulletin, Vol. ii: 3.
- Chicago, Ill.*—Field Columbian Museum: Birds of Eastern N. America, Part 2; Publications, No. 44.
- Chicago, Ill.*—John Crerar Library: Annual Report, Vol. v.
- Chicago, Ill.*—Journal of Geology, Vol. viii.
- Christiania, Norway.*—Videnskabs Selskab: Forhandlingar, 1899; Oversigt, 1899; Skrifter, 1899.
- Chur, Switzerland.*—Naturforschende Gesellschaft Graubündens: Jahresbericht, Vols. xli, xlii.
- Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vol. xix: 5, 6.
- College Hill, Mass.*—Tufts College: College Studies, Vols. v, vi.
- Colorado Springs, Col.*—Colorado College: College Studies, Vols. vii, viii.
- Denver, Col.*—Colorado Scientific Society: Bulletin, No. 2.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vol. x.
- Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Sitzungsberichte, Vol. xii: 2.
- Ekaterinburg, Russia.*—Société Ouralienne des Amis des Sciences Naturelles: Bulletin, Vol. xx.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxxiii, lxxxiv.
- Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 332-356.

- Frankfurt a d Oder, Germany.*—Naturwissenschaftlicher Verein: Helios, Vol. xvii; Societatum Litteræ, Vol. xiv.
- Fribourg, Switzerland.*—Société Fribourgeoise des Sciences Naturelles: Bulletin 5, Vol. xvii.
- Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. xxxix.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vols. xxxiv-xxxvi.
- Guéret, France.*—Société des Sciences Naturelles: Memoirs, 1899.
- Guströw, Germany.*—Verein der Freunde der Naturgeschichte: Archiv, Vol. liii; liv: 1.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proceedings and Trans., Vol. x: 1.
- Halle a d Saale, Germany.*—Kais. Leopold. Carol. Akademie: Abhandlungen, Vol lxxix: 2, 3; Leopoldiana, Vols. xxxv-xxxvii.
- Hamburg, Germany.*—Verein für Naturwissenschaftliche Unterhaltung: Verhandlungen, Vol. x.
- Harlem, Netherlands.*—Musée Teyler: Archives, Vols. vi: 4, 5; vii: 1.
- Hermannstadt, Austria.*—Siebenburgischer Verein für Naturwissenschaften: Verhandlungen, Vols. xlvi, xlvii.
- Indianapolis, Ind.*—Indiana Academy of Sciences: Proceedings, 1898, 1899.
- Iowa City, Iowa.*—Iowa Historical Society: Records, Vol. xvi.
- Kief, Russia.*—Kief Society of Naturalists: Memoirs, Vol. xv, xvi.
- Kiel, Germany.*—Naturwissenschaftlicher Verein: Schriften, Vol. xi: 2.
- Krakowie, Austria.*—Akademie der Wissenschaften: Rosprawy, Vols. xv, xvi, xvii.
- Lansing, Mich.*—State Agricultural College: Bulletin, Nos. 175-181, 185.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vol. xxxv.
- Le Havre, France.*—Société de Géologie de Normandie: Bulletin, Vols. xviii, xix.
- Liverpool, England.*—Geological Society: Proceedings, Vol. viii: 3.
- Madison, Wis.*—Wisconsin Academy of Sciences: Transactions, Vol. xi.
- Madison, Wis.*—Wisconsin Geological and Natural History Survey: Bulletin, No. 6.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs and Proc., Vols. xliii: 5; xliv.
- Melbourne, Victoria.*—Public Library: Report, 1898, 1899.
- Mexico, Mexico.*—Instituto Geologico Nacional: Bulletin, Nos. 12, 13.
- Milwaukee, Wis.*—Public Museum: Annual Report, Vol xvii.
- Minneapolis, Minn.*—Geological and Natural History Survey of Minn.: Annual Report, Vol. xxiv; Final Report, Vols. v, vi.
- Montevideo, Uruguay.*—Museo Nacional: Anales, Vols. ii: 12; xiii: 13, 14.
- Montgomery, Ala.*—Geological Survey of Alabama: Bulletin, No. 6; Warrior Coal Basin.



- Montreal, Canada.*—Canadian Record of Science: Vol. VIII: 2-4.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin 1898: 2, 3, 4; 1899: 1; Memors, Vols. xv: 7; xvi: 1, 2.
- Nantes, France.*—Société Académique de la Loire-Inferieure: Annales, Vols. ix, x.
- Neuchâtel, Switzerland.*—Société des Sciences Naturelles: Bulletin, Vol. xxvi.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxxii.
- New York, N. Y.*—American Museum of Natural History: Annual Report, 1899; Bulletin, Vol. xii.
- Nürnberg, Germany.*—Naturhistorische Gesellschaft: Abhandlungen, Vol. xii.
- Oberlin, Ohio.*—Oberlin College: Laboratory Bulletin, No. 10; Wilson Bulletin, 6: 5, 6.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Annual Report, Vol. x; Notes on Sidney Coal Fields.
- Paris, France.*—Museum d' Histoire Naturelle: Bulletin, 1900.
- Penzance, England.*—Natural History and Antiquarian Society: Report and Transactions, 1894-1898.
- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. xii: 5.
- Philadelphia, Pa.*—Academy of Natural Sciences: Proceedings, 1900.
- Philadelphia, Pa.*—Zoological Society: Annual Report, Vol. xxviii.
- Pisa, Italy.*—Società Toscana di Scienze Naturali: Atti, Vol. xii.
- Port Louis, Mauritius.*—Royal Alfred Observatory: Annual Report, 1898; Meteorological Observations, 1898.
- Regensburg, Germany.*—Naturwissenschaftlicher Verein: Berichte, Vols. vi, vii.
- Riga, Russia.*—Naturforscherverein: Korrespondenzblatt, Vols. xl-xlii.
- Rio de Janeiro, Brazil.*—Museu Nacional: Archivos, Vols. ix, x; Revista, Vol. i.
- Rochester, N. Y.*—Rochester Academy of Natural Sciences: Proceedings, Vol. iii.
- Rovereto, Austria.*—Accademia degli Agiati en Rovereto: Atti, Vols. v: 3, 4; vi: 1, 2.
- Sacramento, Cal.*—California State Mining Bureau: Bulletin, Nos. 13, 14, 16.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: Bericht, 1898.
- St. John's, New Brunswick.*—Natural History Society: Bulletin, Vol. xviii.
- Saint-lô, France.*—Société d' Agriculture et d' Historie Naturelle de la Manche. Memoirs & Docum., Vol. xvii.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vols. x, xi.
- St. Louis, Mo.*—St. Louis Academy of Sciences: Transactions, Vols. ix: 5-9; x: 1-7.

- Sankt Peterburg, Russia.*—Imp. Academy of Sciences: Bulletin, Vols. VII-XI; Memoirs, Vols. VI: 2; VII: 1; VIII: 2, 6, 7, 10; IX: 1, 2, 6, 8, 9; X: 1, 2.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vols. XVII: 6-10; XVIII: 1-10; Memoirs, Vols. VII: 3, 4; VIII: 4; IX: 5; XII: 3; XV: 3.
- Sankt Peterburg, Russia.*—Imp. Mineralogical Society: Verhandlungen, Vols. XXXVI, XXXVII.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vol. II: 2, 3; Occasional Papers, Vol. VII.
- Santiago, Chile.*—Société Scientifique du Chile: Actes, Vols. IX: 4, 5; X: 1.
- Sydney, New South Wales.*—Australian Museum: Records, Vol. III: 6-8.
- Sydney, New South Wales.*—Geological Survey of New South Wales: Mineral Resources, Nos. 7, 8; Records, Vol. IV: 4.
- Sydney, New South Wales.*—Royal Society of New South Wales: Journal, Vol. XXXIII.
- Stockholm, Sweden.*—Kongl. Svenska Veteskaps-Akademien: Bihang, Vol. XXV; Oversigt, 1899.
- Strassburg, Germany.*—Geologischen Landes-Untersuchung. Mitteilungen, Vol. V: 1, 2.
- Topeka, Kans.*—Kansas Academy of Sciences: Transactions, Vols. XV, XVI.
- Torino, Italy.*—Museo Zoologico di Torino: Bulletin, Vol. XIV.
- Toronto, Canada.*—Canadian Institute: Proceedings, Vol. II: 3; Transactions, Vol. VI.
- Toulouse, France.*—Académie des Sciences: Bulletin, Vol. II.
- Upsala, Sweden.*—Geological Institute University of Upsala: Bulletin, Vol. IV: 2.
- Urbana, Ill.*—Illinois State Laboratory: Bulletin, Vol. V: 7-11.
- Washington, D. C.*—U. S. Geological Survey: Annual Report, Vols. XIX, XX; Bulletin, Nos. 157-162; Memoirs, Vols. XXVI, XXXII-XXXVII.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. LXXXIX-LXLI.
- Washington, D. C.*—Weather Bureau: Monthly Weather Review, Vol. XXVIII.
- Wiesbaden, Germany.*—Naturhistorischer Verein: Jahresbericht, Vols. LI-LII.
- Winnipeg, Manitoba.*—Manitoba Historical and Scientific Society: Annual Report, 1899; Transactions, Vols. LV, LVI.
- Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrsschrift, Vols. XLIV: 3, 4; XLV: 1, 2.

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American Association for the Advancement of Science: Proceedings, XLVIII.



The following officers were then elected:

President, - - - - - C. W. Hall.

Vice President, - - - - - O. W. Oestlund.

Recording Secretary, - - - F. G. Warvelle.

Corresponding Secretary, - - C. P. Berkey.

Treasurer, - - - - - E. C. Gale.

Trustees for three years, - { Dr. T. S. Roberts.  
O. W. Oestlund.

Dr. Berkey was instructed to correspond with the officers of the East Side Library in regard to obtaining a permanent home for the Academy library.

#### 252d Meeting, February 5, 1901.

Forty-five members and visitors present.

President Hall in the chair.

Harlow Gale was elected to membership.

The Treasurer's report showed receipts of \$592.50; expenses \$291.61; balance in treasury \$296.99.

The By-Laws were amended so that Sec. II, Art. 2 shall read: "The sections shall cover the following sciences: Astronomy and Mathematics, Botany, Chemistry, Geology, Mineralogy, Physics, Zoology."

Heads of sections were advised to subdivide their sections dependent upon the amount of work being carried on by their associates.

Program:

The Retreat of the Ice Margin across Minnesota, by Professor N. H. Winchell.

Giant Kettles in the Interstate Park, Taylor's Falls, by Warren Upham. (Abstracts of these papers appeared in *Science*, for March 29, 1901, Vol. xiii, N. S. p. 509).

#### 253d Meeting, April 12, 1901.

Fifty members and visitors present.

E. C. Gale was elected trustee for the unexpired term of C. W. Hall.

F. K. Butters read a paper describing some of the lower forms of plant life emphasizing particularly the fungi and their allies. Illustrated.

**254th Meeting, May, 1901.**

Lecture room of Chemistry, University of Minnesota.

Seventy-five persons present.

Professor Geo. B. Frankforter gave a lecture on Color Photography, illustrated by many views, diagrams and experiments.

**255th Meeting, October 8, 1901.**

Directors' room, Public Library.

President Hall presiding.

The thanks of the Academy were voted to the donors of late gifts.

W. F. Decker and W. F. Kunze were elected members.

The program was the experiences of the members during the summer in research work or at the meetings of scientific gatherings. Dr. C. P. Berkey told of his work in Utah, Montana, and Idaho.

Dr. H. T. Eddy spoke of the meetings of the American Mathematical Society and the Institute of Electrical Engineers.

Prof. John Zeleny described the work of the Physics section, A. A. A. S. at Denver; Drs. Frankforter and Harding of the Chemical section; Dr. A. H. Elftman of mining in Colorado.

Prof. E. P. Leavenworth of his research work in Astronomy; A. D. Roe of geodesy, and Prof. N. H. Winchell of the Geological section of the A. A. A. S., which brought forth a discussion of Chamberlin's theory of Celestial Mechanics and Van Hise's theory of Ore Deposits.

**256th Meeting, January 7, 1902.**

**ANNUAL MEETING.**

Nine present.

President Hall in the chair.

Report of Treasurer E. C. Gale:

By balance from 1900.....	\$ 269.99
By Museum receipts, Mar. 6, 1900, to Mar.	
31, 1901 .....	707.65



By Dues .....	46.00
	<hr/>
	\$1,050.54
April 6—To services for museum, March 6, 1900, to Mar. 31, 1901 .....	\$ 577.58
April 6—To services for museum, Mar. 31, 1901, to April 6, 1901 .....	5.50
May 6—To T. H. Colwell for printing bulletin.....	266.80
May 6—To stamps for bulletin.....	10.00
May 6—To C. P. Berkey for services.....	13.20
May 28—To Prof. Hall for sundries.....	5.35
May 28—To Franklin Printing Co. for Exhibition placards .....	6.00
May 31—To sundries and postage for Secretary....	6.06
Oct. 2—To Franklin Printing Co.....	3.00
Oct. 2—To Leslie Paper Co.....	6.13
Jan. 7, 1902—Cash on hand.....	151.64
	<hr/>
	\$1,050.64

The Corresponding Secretary reported: "accessions to the library as 292 domestic, 310 foreign publications, total 602. The issue of Vol. iii, Bulletin 3, of the Bulletins was distributed early in the year to members of the Academy and American Institutions; later in the year to foreign societies through the Smithsonian Institution. The Academy library is partly on shelves at the State University, partly in the Public Library, and partly boxed up at the University. Only a small part is available for reference."

Corresponding Secretary's report of accessions during the year 1901:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. xv; Rad, No. 143.

*Agricultural College, Mich.*—Michigan Agricultural College: Bulletin, Nos. 182-192.

*Albany, N. Y.*—State Library: Annual Report, 1900.

State Museum: Annual Report, 1898; Bulletin, Nos. 35-42.

University of New York: Regents' Report, 1900.

*Amiens, France.*—Société Linnéenne du Nord de la France: Bulletin, Nos. 323-332.

- Austin, Teras.*—Texas Academy of Science: Transactions, Vols. III: IV: 1.
- Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 150-154.
- Bamberg, Germany.*—Naturforschende Gesellschaft: Bericht, Vos. XVIII.
- Barcelona, Spain.*—Real Academia de Ciencias y Artes: Bulletin, Vol. I: 27-30; Nomina Personal, 1900-1901.
- Basel, Switzerland.*—Naturforschende Gesellschaft: Verhandlungen, Vol. XIII: 1.
- Berlin, Germany.*—R. Friedländer & Sohn: Naturæ novitates, Vol. XXII, XXIII.
- Béziers, France.*—Société d' Etude des Sciences Naturelles: Bulletin, Vol. XXII.
- Bombay, India.*—Royal Asiatic Society: Journal, Vol. xx: 56.
- Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vol. XXXVI.
- Boston, Mass.*—Horticultural Society: Transactions, 1900.
- Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, Vol. XVI.
- Bruxelles, Belgium.*—Société Belge de Géologie: Bulletin, Vol. XIV.
- Bruxelles, Belgium.*—Société Malacologique de Belgique: Bulletin, 1900, 1901.
- Bruxelles, Belgium.*—Société Royal de Botanique de Belgique: Bulletin, Vol. XXXIX.
- Buenos Aires, Argentine.*—Instituto Geographico Argentino: Bulletin, Vol. xx: 7-12.
- Buenos Aires, Argentine.*—Museo Nacional: Com's. Vol. I: 7, 8.
- Buenos Aires, Argentine.*—Sociedad Cientifica Argentina: Anales, Vols. L, LI, LII.
- Calcutta, India.*—Geological Survey of India: Memoirs, Vols. II: 2; III: 1, 2; XXVIII: 2; XXX: 2; XXXIII: 1.
- Cambridge, Mass.*—Harvard College Observatory: Annals, Vols. XXXVII: 1; XXXVIII: 2; XLVIII: 7; Annual Report, 1900.
- Cambridge, Mass.*—Museum of Comparative Zoology: Bulletin, Vols. XXXVI: 7, 8; XXXVII: 3; XXXVIII: 2; XXXIX: 1.
- Cape Town, South Africa.*—South African Philosophical Society: Transactions, Vols. XI: 2; XII, pp. 1-563.
- Cardiff, England.*—Naturalists' Society: Report and Transactions, Vol. XXXII.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos. 64-70.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. XVII.
- Cœnrbourg, France.*—Société National des Sciences Naturelles: Memoirs, Vol. xxx, xxxi.
- Chicago, Ill.*—Botanical Gazette: Vols. xxxi, xxxii.
- Chicago, Ill.*—Field Columbian Museum: Publications, Nos. 45, 51-59.
- Chicago, Ill.*—John Crerar Library: Annual Report, Vol. VI.



- Chicago, Ill.*—Journal of Geology: Vol. ix.
- Christiania, Norway.*—Videnskabs Selskab: Skrifter, 1900.
- Chur, Switzerland.*—Naturforschende Gesellschaft Graubündens: Jahresbericht, Vols. XLIII, XLIV.
- Colorado Springs, Col.*—Colorado College: Studies, Vol. ix.
- Columbia, Mo.*—University of Missouri: University Studies, Vol. i: 1.
- Denver, Col.*—Colorado Scientific Society: Proceedings, Vols. vi; vii, pp. 13-40.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vol. xi.
- Des Moines, Iowa.*—Iowa Academy of Sciences: Proceedings, Vols. vi, vii.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. LXXXV.
- Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 357-360.
- Frankfurt a d Oder, Germany.*—Naturwissenschaftlicher Verein: Heftos, Vol. xviii.
- Fribourg, Switzerland.*—Société Fribourgeoise des Sciences Naturelles: Bulletin, Vol. viii; Memoirs, 1901.
- Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. xl.
- Georgetown, British Guiana.*—Royal Agricultural and Commercial Society: Journal, Vol. xii.
- Görlitz, Germany.*—Naturforschende Gesellschaft: Abhandlungen, Vol. xxiii.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. xxxvii.
- Guéret, France.*—Société des Sciences Naturelles: Memoirs, 1900.
- Guströw, Germany.*—Verein der Freunde der Naturgeschichte: Archiv, Vols. liv: 2; lv: 1.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proceedings, Vol. x: 2.
- Hamilton, Canada.*—Hamilton Association: Journal and Proceedings, No. 16.
- Hannover, Germany.*—Naturhistorische Gesellschaft: Jahresbericht, Vols. XLVIII, XLIX.
- Harlem, Netherlands.*—Musée Teyler. Archives, Vol. vii: 2, 3.
- Hermannstadt, Austria.*—Siebenbürgischer Verein für Naturwissenschaften: Verhandlungen, Vols. XLVIII, XLIX.
- Innsbruck, Austria.*—Naturwissenschaftlich-Medizinischer Verein: Berichte, Vol. xxv.
- Iowa City, Iowa.*—Iowa Historical Society: Records, Vol. xvii.
- Kassel, Germany.*—Verein für Naturkunde: Abhandlungen, Vols. XLIV, XLV.
- Kiel, Germany.*—Naturwissenschaftlicher Verein: Schriften, Vol. xii: 1.
- Kjöbenhavn, Denmark.*—Naturhistoriske Forening: Meddelelser, 1900.
- Lansing, Mich.*—State Agricultural College: Bulletin Exp. Station, Nos. 182-184, 186, 191.

- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vol. xxxvi.
- Lawrence, Kans.*—Kansas State University: Bulletin, Vols. i: 4-8; ii: 1.
- Liège, Belgium.*—Société Géologique de Belgique: Annales, Vols. xxvi, xxvii.
- Liverpool, England.*—Geological Society: Proceedings, Vols. viii: 4; ix: 1.
- Lüneberg, Germany.*—Naturwissenschaftlicher Verein: Jahresheft, Vol. xv.
- Madison, Wis.*—Wisconsin Academy of Sciences, Arts and Letters: Transactions, Vol. xii.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs and Trans., Vol. xiv.
- Mexico, Mexico.*—Instituto Geologico Nacional: Bulletin, No. 14.
- Milwaukee, Wis.*—Public Museum: Annual Report, Vol. xviii.
- Montevideo, Uruguay.*—Museo Nacional: Anales, Vols. ii: 16, 17; iii: 18, 20, 21.
- Montgomery, Ala.*—Geological Survey of Alabama: Plant-life of Alabama.
- Montreal, Canada.*—Canadian Record of Science: Vol. viii: 5, 6.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin, 1900: 1-3; 1899: 2-4.
- New Haven, Ct.*—Connecticut Academy of Arts and Sciences: Transactions, Vol. x.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxxiii.
- New York, N. Y.*—American Museum of Natural History: Bulletin, Vol. xiii.
- Nürnberg, Germany.*—Naturhistorische Gesellschaft: Abhandlungen, Vol. xiii.
- Oberlin, Ohio.*—Oberlin College: Library Bulletin, No. 5. Wilson Bulletin, Vol. vii.
- Offenbach, Germany.*—Verein für Naturkunde: Bericht, Vols. xxxvii-xlii.
- Osnabrück, Germany.*—Naturwissenschaftlicher Verein: Jahresbericht, 1899, 1900.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Catalogue of Canadian Birds.
- Paris, France.*—Museum d' Histoire Naturelle: Bulletin, 1901.
- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. xii: 6.
- Philadelphia, Pa.*—Academy of Natural Sciences: Proceedings, Vol. liii.
- Philadelphia, Pa.*—Wagner Free Institute of Science: Transactions, Vol. iii: 5.
- Philadelphia, Pa.*—Zoological Society of Philadelphia: Annual Report, Vol. xxix.



- Port Louis, Mauritius.*—Royal Alfred Observatory: Meteorological Observations, 1898.
- Prag, Bohemia.*—Böhmische Gesellschaft der Wissenschaften: Jahresbericht, 1899; Sitzungsberichte, 1899, 1900.
- Reichenberg, Bohemia.*—Verein der Naturfreunde: Mitteilungen, Vol. XXXI.
- Riga, Russia.*—Naturforscherverein: Korrespondenzblatt, Vols. XLIII, XLIV.
- Rochester, N. Y.*—Rochester Academy of Natural Science: Proceedings, Vol. iv, pp. 1-64.
- Rovereto, Austria.*—Accademia degli Agiati in Rovereto: Atti, Vol. VI: 3, 4.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: Bericht, 1899.
- St. John's, New Brunswick.*—Natural History Society: Bulletin, No. XIX.
- Saint-lô, France.*—Société d'Agriculture et d'Histoire Naturelle de la Manche: Memoirs and Docum., Vol. XVIII.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vol. XII.
- St. Louis, Mo.*—St. Louis Academy of Science: Transactions, Vols. x: 8-11; xi: 1-6.
- Sankt Peterburg, Russia.*—Imp. Academy of Sciences: Bulletin, Vol. XII.
- Sankt Petersburg, Russia.*—Geological Committee: Bulletin, Vol. XIX: 1-6; Memoirs, XIII: 3.
- Sankt Peterburg, Russia.*—Imp. Mineralogical Society: Verhandlungen, Vol. XXXVIII.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vols. I: 8, 9; II: 4-11; III: 1; Occasional Papers, Vol. VIII.
- Santiago, Chile.*—Société Scientifique du Chile: Actes, Vols. x: 2; xi: 1.
- Sydney, New South Wales.*—Australian Museum: Report, 1899; Records, Vol. IV: 1, 3, 4.
- Sydney, New South Wales.*—Geological Survey of New South Wales: Annual Report, 1899; Mineral Resources, No. 9.
- Sydney, New South Wales.*—Royal Society of New South Wales: Proceedings, Vol. XXXIV.
- Stavanger, Norway.*—Stavanger Museum: Aarsberetning, 1900.
- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Bihang, Vol. XXVI; Ofversigt, 1900.
- Strassburg, Germany.*—Geologische Landes-Untersuchung: Mitteilungen, Vol. v: 3.
- Torino, Italy.*—Museo Zoologico di Torino. Bulletin, Vol. xv.
- Toronto, Canada.*—Canadian Institute: Proceedings, Vol. II, 4; Transactions, Vol. VII: 1.
- Upsala, Sweden.*—Geological Institute University of Upsala: Bulletin, Vol. v: 1.
- Urbana, Ill.*—Illinois State Laboratory: Bulletin, Vol. v: 12.

- Washington, D. C.*—Bureau of American Ethnology: Annual Report, Vols. xvi, xvii.  
*Washington, D. C.*—United States Geological Survey: Annual Report, Vol. xxi; Bulletin, Nos. 163-176.  
*Washington, D. C.*—National Museum: Bulletin, Vols. xlvii: 4; l: 1; Proceedings, Vol. xxii.  
*Washington, D. C.*—Patent Office: Official Gazette, Vols. xciv-xcvii.  
*Washington, D. C.*—Smithsonian Institution: Annual Report, 1898.  
*Washington, D. C.*—Weather Bureau: Monthly Weather Review, Vol. xxix; Report, 1899.  
*Wiesbaden, Germany.*—Naturhistorischer Verein für Naturkunde: Jahrbuch, Vol. lxi.  
*Winnipeg, Manitoba.*—Manitoba Historical and Scientific Society: Annual Report, 1900; Transactions, Nos. 57-59.  
*Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrschrift, Vols. xlv: 3, 4; xlvi: 1, 2.

The following officers were elected:

President,	- - - - -	C. W. Hall.
Vice President,	- - - - -	O. W. Oestlund.
Recording Secretary,	- - -	G. S. Beane.
Corresponding Secretary,	- -	C. P. Berkey.
Treasurer,	- - - - -	E. C. Gale.
Trustees,	- - - - -	{ H. T. Eddy.
		{ E. C. Hale

President Hall then addressed the Academy on the Progress and Results of Scientific Research in Minnesota

**257th Meeting, February 11, 1902.**

Seven present.

Dr. J. K. Hosmer in the chair.

Program:

Studies in the Classification of Insects, by O. W. Oestlund.

Origin and Distribution of Minnesota Clays, by C. P. Berkey.

[ABSTRACT]

The paper presented was the result of the gathering of data on the clay industry of Minnesota, together with a review of the known geology of the state. The types of clays found and their occurrences were enumerated and the origin of each type outlined.



The classification made for Minnesota clays is:

1. Residuary Clays—
  - a.—From decay of feldspathic rocks,—unimportant.
  - b.—From residues of soluble rocks,—driftless area.
2. Transported Clays—
  - A.—Sedimentary Formations used as clays.
    - 1.—Argillaceous Slates:  
Huronian slates—unimportant.
    - 2.—Clay Shales:  
Ordovician shales—Southeastern Minnesota.  
Cretaceous shales—local.
  - B.—Glacial Clays:
    - 1.—Glacial till—very widely distributed.
    - 2.—Glacial Lake clays—many important deposits.
    - 3.—Glacial stream deposits—many occurrences along the Mississippi and Minnesota Rivers.
  - C.—Recent Alluvial Deposits.
  - D.—Loess or Wind Deposits,—the loam clays of Red River valley and other places.

The complete paper has been published in the *American Geologist* for March, 1902. Vol xxix, pp. 171-177.

Drs. Eddy and Hosmer were appointed a committee to be associated with A. D. Roe in the management of the museum.

The President and two Secretaries were appointed a membership committee.

#### **258th Meeting, March 10, 1902.**

Chemistry Lecture room, University of Minnesota.

President Hall presiding.

A good audience was present.

A paper on A Study of the Relation between Animal Structure and its Surroundings was read by Professor H. L. Osborn of Hamline University, and illustrated by charts and specimens.

#### **259th Meeting, April 10, 1902.**

Chemistry Lecture room, University of Minnesota.

President Hall in the chair.

Eighty persons present.

Dr. F. W. Sardeson gave an illustrated lecture on The History of Vertebrata from the Devonian age to Mamalia and Man.

A communication from the Carnegie Institute of Chicago was read and referred to the Astronomical section with power to act.

**260th Meeting, May 20, 1902.**

Chemistry Lecture room, University of Minnesota.

President Hall in the chair.

A good audience present.

J. P. Magnusson of Brainerd, S. J. Race of Redwood Falls, C. W. Sage, of Fountain, and C. W. Jackson, of Hallock, were elected members.

Professor H. T. Eddy gave a lecture on Attenuation and Distortion of Long-Distance Telephone and Power Transmission Lines regarded as Hydrodynamic Phenomena.

[ABSTRACT.]

The analogy of a steady flow of water in a long pipe under the action of a constant head and a continuous current of electricity under a constant pressure such as is furnished by one or more cells of a battery, has often been employed to give a clear elementary physical conception of the mathematical relations expressed by Ohm's law. In this case the applied pressure is gradually consumed by the resistance experienced by the current, and in strict analogy with the flow of water, the loss per unit of length is proportional to the product of the square of the current and the first power of the resistance. So far as the mathematical relations are concerned the two problems are identical.

The object of this paper was to extend this hydrodynamic analogy to the more complicated case of long distance transmission of alternating currents in general.

Telephone transmission was specifically mentioned in the title in order to include the general case of variable frequency. The importance of thus extending and enlarging this analogy is evident when we reflect that all the complicated phenomena of long distance lines and cables with their sending and receiving apparatus may be completely reproduced in all its details of operation by simple pumping machinery with its transmission pipes and air chambers, whose manner of operation may be made clear to any one without the aid of higher analysis.

In conclusion, it may readily be shown that in both of the two extreme cases already considered, viz., those in which either friction or inertia is disregarded, the logarithm of the reciprocal of the amplitude, or intensity of wave at any point, varies directly as the product of the distance of the point from the source of the wave by its velocity. Since this velocity has already been shown to be constant in case the fluid friction may be disregarded and to increase with the frequency in case the inertia be disregarded, it is evident that the



attenuation depends upon frequency in case of fluid friction without inertia, but it is independent of frequency in case of inertia without fluid friction. Such unequal attenuation in the telephone obliterates to a greater or less extent tones of high pitch before it does those of lower pitch. It is therefore necessary to distinct transmission that the self induction of the line should be large enough to store a large amount of kinetic and potential energy in the wave motion along the line, which in all its aspects is strictly analogous to the wave motion propagated in the water in the apparatus just described.

### 261st Meeting, October 7, 1902.

Public Library; President Hall presiding.

Seven persons present.

A committee of Messrs Gale, Winchell, Eddy, and Hall was appointed to consider the property interests of the Academy.

F. C. Kent, H. L. Lyons, and F. K. Butters were elected members.

O. W. Oestlund read a paper on the Classification of Insects.

#### [ABSTRACT.]

A preliminary account was given on an extended work on the classification of insects. Attention was called to the value of some of the early writers on the taxonomy of insects as interpreted from a modern standpoint. Linné in his first edition of his *Sytema Naturae* divided the insects into three orders, (excepting the *Aptera*): 1. *Coleoptera*, including the *Orthoptera*. 2. *Hemiptera*. 3. *Angioptera*, indicating three main divisions of the class. In later editions Linné did not recognize the broad characters of the *Angioptera*. Latreille gave more exact interpretation to the same idea in his division of the orders in two main groups, the *Elytroptera* (including *Orthoptera*, *Coleoptera*, and *Hemiptera*), and *Gymnoptera*, equivalent to Linné's *Angioptera*.

It was pointed out that the so-called incomplete and complete metamorphosis has not the taxonomic value usually ascribed to it in dividing the insects into two series, the *Heterometabola* and the *Holometabola*. Metabolism is characteristic of the class and is undoubtedly monophyletic. The *heterometabola* are more primitive than the *holometabola*, but the *holometabolous* condition is polyphyletic, arising separately in several cases as in the *Coleoptera*, the males of the *Coccidæ*, and probably also for the *Hymenoptera*.

Paleontology also indicates some fundamental characters in the fact that the *Pallodictyoptera* contain three distinct lines of development: the *Orthopteroidea*, *Hemipteroidea*, and *Neuropteroidea* of Scudder. From the *Orthopteroidea* line of development we have the mod-



ern orders Orthoptera, and Coleoptera; the Hemipteroidea give us the Hemiptera and Homoptera; the Neuropteroidea have split up into the orders Neuroptera, Hymenoptera, Lepidoptera, and Diptera. Adopting Latreille's terms for the first and the third, and that of Fabricius for the second we have the three series Elytroptera, Rhynchota and Gymnoptera.

The three lines of modifications are also indicated by their habitat as one of the underlying causes. The Elytroptera are ground insects, hence their modification of the front wings for protection. The Rhynchota are semi-parasitic on plants, hence their main line of modification is seen in the formation of the jointed beak for piercing and sucking. The suctorial Hemiptera existed long before the suctorial trophi of the other orders had come into existence, and is a more primitive type than those of Diptera. The Gymnoptera are mainly arborial or aerial in habitat, the birds among the insects, hence their peculiar modifications of the wings so distinct from the first.

There are also some ontogenetic facts that point the same way. The embryonic membranes of primitive insects were temporary organs and did not persist to the time of hatching. Blastokenesis is characteristic of primitive Orthoptera, Hemiptera and Neuroptera. It is only in the more modern orders that one or both of the membranes persist to the time of hatching. Based upon these and other facts that await a future and more extended treatment, the following arrangement of the orders of insects into series was proposed.

Series *Elytroptera*. Ground insects; wings dissimilar, front pair elytra, hind pair membranous and folded when at rest, of primary importance in flight; trophi mandibulate. Orders:

Orthoptera, s. l.

Coleoptera.

Series *Rhynchota*. Semiparasitic; trophi forming a jointed rostrum adapted for piercing and sucking. The sucking trophi already present at the time of hatching. Wing modification of secondary importance in comparison with the Elytroptera, and Gymnoptera. Metamorphosis gradual. Orders:

Hemiptera.

Homoptera.

Series *Gymnoptera*. Arborial or aerial insects; the two pair of wings similar, the front pair of primary importance in flight; the hind pair often reduced or lost. Trophi mandibulate in Neuroptera; suctorial in the Hymenoptera, Lepidoptera, and Diptera. Orders:

Neuroptera, s. l.

Hymenoptera.

Lepidoptera.

Diptera.

The recognition of a larger number of orders, as the 17 of Brauer, or in a probable still greater division of the future, in no way invalidates the recognition of three series in place of two, but brings out a number of additional facts in its favor.



## 262d Meeting, January 5, 1903.

## ANNUAL MEETING.

Secretary Berkey presiding.

Nine persons present.

The officers elected were:

President. - - - - - T. B. Walker.

Vice President, - - - - - C. P. Berkey.

Corresponding Secretary, - - - O. W. Oestlund.

Recording Secretary, - - - Geo. S. Beane.

Treasurer, - - - - - Edw. C. Gale.

Trustees for three years, - - { A. D. Roe.  
J. K. Hosmer.

Dr. A. H. Elftman read the outline of a paper prepared by him last year for presentation before the Geological Society of America on Moraines of Glacial Retreat across Minnesota.

## 263d Meeting, February 3, 1903.

President Walker in the chair.

Eight persons present.

The retiring Corresponding Secretary, C. P. Berkey, reported library accessions for the year 1902, as 393 foreign and 373 domestic publications, coming from 92 foreign and 60 domestic societies.

The total number of publications in the Academy Library to January 1, 1903, was 10,674:

Report of the Corresponding Secretary of accessions during 1902:

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. xvi; Rad, Nos. 147, 149.

*Agricultural College, Mich.*—Michigan Agricultural College: Bulletin Exp. Station, Nos. 193-202.

*Albany, N. Y.*—State Library: Annual Report, 1901.

State Museum: Annual Report, 1899; Bulletin, Nos. 48-57.

University of New York: Regents' Report, 1901.

*Altenburg, Germany.*—Naturforschende Gesellschaft: Mitteilungen, Vol. x.

*Amiens, France.*—Société Linnéenne du Nord de la France: Memoirs, Vol. x.

- Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 155-160.
- Barcelona, Spain.*—Academia de Ciencias y Artes: Bulletin, Vol. II: 1-4; Memoirs, Vol. IV: 1-27; Nomina Personal, 1901.
- Basel, Switzerland.*—Naturforschende Gesellschaft: Verhandlungen, Vols. XIII: 2, 3; XIV.
- Belfast, Ireland.*—Natural History and Philosophical Society: Report, 1900, 1901.
- Berlin, Germany.*—R. Friedländer & Sohn: Naturæ novitates, 1902.
- Bombay, India.*—Royal Asiatic Society: Journal, Vol. XXI, No. 57.
- Bône, Algeria.*—Académie d' Hippone: Comptes Rendus, 1900.
- Bonn, Germany.*—Naturhistorische Verein: Verhandlungen, Vols. LVII: 1, 2; LVIII: 1; Sitzungsberichte, 1900, 1901.
- Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vols. XXXVII; XXXVIII: 1-9.
- Boston, Mass.*—Boston Society of Natural History: Proceedings, Vol. XXX.
- Boston, Mass.*—Horticultural Society: Transactions, 1901.
- Boulder, Col.*—University of Colorado: Studies, Vol. I: 1, 2.
- Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen, Vol. XVII: 1.
- Brisbane, Queensland.*—Geological Survey of Queensland: Publications, Nos. 127-178.
- Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, Vol. XVII: 1.
- Brünn, Austria.*—Naturforschender Verein: Bericht, Vols. XVIII, XIX; Verhandlungen, Vols. XXXVIII, XXXIX.
- Bruxelles, Belgium.*—Société Malacologique de Belgique: Bulletin, 1902.
- Budapest, Hungary.*—Hungarian Central Bureau of Ornithology, Aquila, Vol. VIII.
- Buenos Aires, Argentine.*—Museo Nacional: Anales, Vols VII, VIII; Com's., Vol. I: 9, 10.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Anales, Vols. LIII, LIV.
- Calcutta, India.*—Geological Survey of India: Memoirs, Vols. XXX: 3, 4; XXXI: 1-3; XXXII: 1, 2; XXXIII: 2; XXIV: 1.
- Cambridge, Mass.*—Harvard College Observatory: Annals, Vols. XLIV: 2; XLVII: 1; Annual Report, 1901.
- Cambridge, Mass.*—Museum of Comparative Zoology: Bulletin, Vols. XXXVIII: 3-5; XXXIX: 2-5; XL: 1-3; XLI: 1.
- Cape Town, South Africa.*—South African Philosophical Society: Transactions, Vol. XI: 3.
- Cardiff, England.*—Naturalists' Society: Report and Transactions, Vol. XXXIII.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos. 72, 73.
- Cherbourg, France.*—Société Nationale des Sciences Naturelles: Memoirs, Vol. XXXII.



- Chicago, Ill.*—Botanical Gazette, Vols xxxiii, xxxiv.  
*Chicago, Ill.*—Field Columbian Museum: Publications, Nos. lx-lxviii.  
*Chicago, Ill.*—John Crerar Library: Annual Report, Vol. vii; List of Current Periodicals.  
*Chicago, Ill.*—Journal of Geology, Vol. x.  
*Christiania, Norway.*—Videnskabs Selskab: Förhandlingar, 1900, 1901; Skrifter, 1901.  
*Chur, Switzerland.*—Naturforschende Gesellschaft Graubündens: Jahresbericht, Vol. xlv.  
*Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vol. xx: 1, 2.  
*College Hill, Mass.*—Tufts College: College Studies, No. 7.  
*Columbia, Mo.*—University of Missouri: University Studies, Vol. i: 2, 3.  
*Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vol. xii.  
*Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Archiv, Vol. xii: 1; Schrifter, No. 10; Sitzungsberichte, Vol. xii: 3.  
*Ekaterinburg, Russia.*—Société Ouralienne des Amis des Sciences Naturelles: Bulletin, Vols. xxi, xxii.  
*Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxxvi.  
*Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 1-22.  
*Frankfurt a d Oder.*—Naturwissenschaftlicher Verein: Helios, Vol. xix.  
*Fribourg, Switzerland.*—Société Fribourgeoise des Sciences Naturelles: Bulletin, Vol. ix; Memoirs, 1900.  
*Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. xli.  
*Georgetown, British Guiana.*—Royal Agricultural and Commercial Society: Journal, 1901.  
*Granville, Ohio.*—Denison University. Bulletin, Vols. xi: 9-11; xii: 1-4.  
*Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. xxxviii.  
*Guéret, France.*—Société des Sciences Naturelles: Memoirs, Vol. viii: 1.  
*Habana, Cuba.*—Academia di Ciencias: Anales, Vol. xxxviii.  
*Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proceedings, Vol. x: 3.  
*Hamburg, Germany.*—Verein für Naturwissenschaftliche Unterhaltung: Verhandlungen, Vol. xi.  
*Hamilton, Canada.*—Hamilton Association: Journal and Proceedings, Vols. xvii, xviii.  
*Harlem, Netherlands.*—Museum Teyler: Archives, Vols. vii: 4; viii: 1.  
*Hermannstadt, Austria.*—Siebenbürgischer Verein für Naturwissenschaften: Verhandlungen, Vols. l, li.  
*Indianapolis, Ind.*—Indiana Academy of Sciences: Proceedings, 1901.  
*Innsbruck, Austria.*—Naturwissenschaftlich-Medizinischer Verein: Berichte, Vols. xxvi, xxvii.

- Iowa City, Iowa.*—Iowa Historical Society: Records, Vol. xviii.
- Kassel, Germany.*—Verein für Naturkunde: Abhandlungen, Vols. xlvi, XLVII.
- Kazan, Russia.*—Society of Naturalists of the Imp. University: Memoirs, Vols. xxxiii: 5, 6; xxxiv; xxxv; 1-5; Protokol, 1899, 1900.
- Kief, Russia.*—Kief Society of Naturalists: Memoirs, Vol. xvii.
- Kjöbenhavn, Denmark.*—Naturhistoriske Förenlg: Meddelelser, 1901.
- Krakowie, Austria.*—Akademie der Wissenschaften: Rosprawy, Vols. xxxviii, xl, xli.
- Lansing, Mich.*—State Agricultural College: Bulletin Exp. Station, Nos. 193-198, 201.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vols. xxxvii, xxxviii: 143, 144.
- Lawrence, Kans.*—Kansas State University: Bulletin, Vols. ii: 2-9
- Madison, Wis.*—Wisconsin Geological and Natural History Survey: Bulletin, Vol. vii.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs and Proc., Vol. xlvi.
- Mexico, Mexico.*—Instituto Geologico Nacional: Bulletin, No. 15.
- Milwaukee, Wis.*—Public Museum: Annual Report, Vols. xix, xx.
- Montevideo, Uruguay.*—Museo Nacional: Anales, Vol. iii: 19, 22.
- Montreal, Canada.*—Canadian Record of Science: Vol. viii: 7, 8.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin, 1900: 4; 1901; 1902.
- Nantes, France.*—Société Académique de la Loire-Inferieure: Annales, Vols. i, ii.
- Neuchâtel, Switzerland.*—Société des Sciences Naturelles: Bulletin, Vol. xxvii.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxxiv.
- New York, N. Y.*—American Museum of Natural History: Bulletin, Vols. xiv; xv: 1; xvii: 1, 2; xviii: 1; Annual Report, 1900.
- Nürnberg, Germany.*—Naturhistorische Gesellschaft: Festschrift.
- Oberlin, Ohio.*—Oberlin College: Laboratory Bulletin, Nos. 11, 12; Wilson Bulletin, Vol. viii.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Annual Report, Vol. xi; Index to Reports, 1863-1884; Klondyke Goldfield; Report Meteorological Service, 1899, 1900.
- Paris, France.*—Museum d'Histoire Naturelle: Bulletin, 1902: 1-4.
- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. xii: 7.
- Philadelphia, Pa.*—Academy of Natural Sciences: Proceedings, Vol. liv: 1, 2.
- Philadelphia, Pa.*—Zoological Society of Philadelphia: Annual Report, Vol. xxx.
- Pisa, Italy.*—Società Toscana di Scienze Naturali: Atti, Vol. xiii.
- Portland, Maine.*—Portland Society of Natural History: Proceedings, Vol. ii: 5.



- Port Louis, Mauritius*.—Royal Alfred Observatory: Annual Report, 1899; Meteorological Observations, 1899.
- Prag, Bohemia*.—Böhmische Gesellschaft der Wissenschaften: Jahresbericht, 1900; Sitzungsbericht, 1901.
- Regensburg, Germany*.—Naturwissenschaftlicher Verein: Berichte, Vol. VIII.
- Riga, Russia*.—Naturforscherverein: Korrespondenzblatt, Vol. XLV.
- Rovereto, Austria*.—Accademia degli Agiati in Rovereto: Atti, Vols. VII: 1-4; VIII: 1, 2.
- St. Gall, Switzerland*.—Naturwissenschaftliche Gesellschaft: Bericht, 1900.
- St. John's New Brunswick*.—Natural History Society: Bulletin, Vol. XX.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vol. XIII.
- St. Louis, Mo.*—St. Louis Academy of Natural Science: Transactions, Vols. XI: 7-11; XII: 1-9.
- Sankt Peterburg, Russia*.—Imp. Academy of Sciences: Bulletin, Vols. XIII-XVII; Memoirs, Vols. x: 3, 5, 6, 7; xi: 5, 6, 7, 10, 11; xii: 4, 6, 7, 8; xiii: 3, 5, 7.
- Sankt Peterburg, Russia*.—Geological Committee: Bulletin, Vols. XIX: 7-10; XX: 1-6; Memoirs, Vol. XVIII: 1, 2.
- Sankt Peterburg, Russia*.—Imp. Mineralogical Society: Verhandlungen, Vol. XXXIX.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vol. III: 2-4.
- Santiago, Chile*.—Société Scientifique du Chile: Actes, Vol. XI: 3-5...
- Sydney, New South Wales*.—Australian Museum: Report, 1900, 1901; Records, Vol. IV: 2, 5, 6.
- Sydney, New South Wales*.—Geological Survey of New South Wales: Annual Report, 1901.
- Stavanger, Norway*.—Stavanger Museum: Aarsberetning, 1901.
- Stockholm, Sweden*.—Geologiska Byrån: Afhandlingar, A, 1902; Ba 6; C 184-192; Ca 1, 2.
- Topeka, Kans.*—Kansas Academy of Sciences: Transactions, Vol. XVII.
- Torino, Italy*.—Museo Zoologico di Torino: Bulletin, Vol. XVI.
- Toulouse, France*.—Académie des Sciences: Memoirs, Vol. I.
- Washington, D. C.*—Bureau of American Ethnology: Annual Report, Vols. XVIII, XIX.
- Washington, D. C.*—United States Geological Survey: Bulletin, Nos. 177-184, 187, 188, 190, 192-194, 199; Monographs, Vols. XXXIX, XL, XLI.
- Washington, D. C.*—National Museum: Bulletin, Nos. 39: N, P, Q; I: 2; Proceedings, Vol. XXIV.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. XCVIII-CI; Annual Report.
- Washington, D. C.*—Smithsonian Institution: Annual Report, 1899.
- Washington, D. C.*—Weather Bureau: Monthly Weather Review, Vol. XXX: 1-10.

- Wiesbaden, Germany.*—Naturhistorischer Verein für Naturkunde: Jahrbuch, Vol. LIV.  
*Winnipeg, Manitoba.*—Manitoba Historical and Scientific Society: Annual Report, 1901; Transactions, Nos. LX-LXII.  
*Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrsschrift, Vols. XLVI: 3, 4; XLVII: 1, 2.  
*Zurich, Switzerland.*—Physikalischen Gesellschaft: Jahresbericht, 1900. Mitteilungen, Nos. 1, 2.

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- American Association for the Advancement of Science: Proceedings, Vol. XLIX.  
 Australian Association for the Advancement of Science: Report, Vols. vii, viii.

A committee of T. B. Walker, N. H. Winchell, and C. P. Berkey was appointed to seek recognition and financial aid from the State Legislature.

#### 264th Meeting, March 3, 1903.

Vice President C. P. Berkey in the chair.

Twenty persons present.

Program:

Some Minnesota Glacial Problems, by Dr. A. H. Elftman.

Review of the Question of the Age of the Fossil Man of Lansing, by Prof. N. H. Winchell.

#### 265th Meeting, February 2, 1904.

##### ADJOURNED ANNUAL MEETING.

Secretary pro tem Roe presiding.

Reports of Treasurer E. C. Gale for 1902 and 1903 were read and approved.

Report of 1902:

Balance from 1901.....\$151.64

Receipts from museum from April, 1901, to

September 14, 1902 ..... 900.70

—————\$1,052.34

Contra:

Cash paid Curator Roe for museum services

April 1, 1901, to September 14, 1902.....\$698.95



To insurance for for three years.....	11.00
“ Fisher Paper Box Co.....	5.55
“ University Press, printing.....	4.00
“ Franklin Printing Co.....	3.00
“ cleaning museum .....	8.00
“ postal cards to G. S. Beane.....	1.75
Balance on hand .....	320.09
	————\$1,052.34

## Report of 1903:

Balance from 1902.....	\$320.09
Contra:	
To Cor. Sec’y. Berkey for clerk hire and ex- penses .....	\$ 26.25
Jan. 30—To Rec. Sec’y. for printing and post- age, .....	3.80
May 28—To expenses on publications from Univ. of State of N. Y.....	1.69
May 30—To Rec. Sec’y. Beane for printing and postage .....	5.50
Jan. 5, 1904—Cash on hand.....	282.85
	————\$ 320.09

## Report of the Corresponding Secretary of accessions for the year 1903:

- Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. xvii; Rad, No. 151.
- Agricultural College, Mich.*—Michigan Agricultural College: Bulletin, Nos. 204-210; Spec. Bulletin, No. 20.
- Albany, N. Y.*—State Library: Annual Report, 1902; Bulletin, No. 79.  
State Museum: Annual Report, 1900; Bulletin, Nos. 267, 270, 271, 273, 274, 281-286, 288, 290, 291.  
University of New York: Regents’ Report, 1902.
- Amsterdam, Netherlands.*—Royal Academy of Sciences: Verhandlungen, Vol. viii, Nos. 3-6.
- Austin, Texas.*—Texas Academy of Science: Transactions, Vol. v.
- Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 162-165.
- Barcelona, Spain.*—Real Academia di Ciencias y Artes: Bulletin, Vol. ii: 5; Memoirs, Vol. iv: 28-36; Nomina Personal, 1902.
- Basel, Switzerland.*—Naturforschende Gesellschaft: Verhandlungen, Vols. xv: 1; xvi.
- Belfast, Ireland.*—Natural History and Philosophical Society: Guide to Belfast.

- Bergen, Norway.*—Bergens Museum: Aarsberetning, 1899-1902; Aar-  
bog, 1896-1902, 1903: 1.
- Berlin, Germany.*—R. Friedländer & Sohn: Naturæ Novitates, 1903.
- Bologna, Italy.*—Accademia delle Scienze dell' Instituto di Bologna:  
Memoirs, Vol. viii; Rendiconto, Vol. iv.
- Boston, Mass.*—American Academy of Arts and Sciences: Proceedings,  
Vols. xxxviii: 10-26, xxxix: 1-12.
- Boston, Mass.*—Boston Society of Natural History: Proceedings, Vol.  
xxxi: 1-5.
- Boston, Mass.*—Horticultural Society: Transactions, 1902, 1903.
- Boulder, Col.*—University of Colorado: Bulletin, Vol. ii: 4; Studies,  
Vol. i: 3; Dpt. Psychology, Vol. i: 3, 4.
- Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen,  
Vol. xvii: 2.
- Brisbane, Queensland.*—Geological Survey of Queensland: Publica-  
tions, Nos. 179-183. Sketch of Map of Queensland.
- Brisbane, Queensland.*—Royal Society of Queensland: Proceedings,  
Vol. xvii: 2.
- Brooklyn, N. Y.*—Institute of Arts and Sciences: Bulletin, Vol. i: 1-3;  
Cold Springs Monographs, Nos. 1, 2.
- Brünn, Austria.*—Naturforschender Verein: Bericht, Vol. xx; Ver-  
handlungen, Vol. xi.
- Bruxelles, Belgium.*—Société Entomologique de Belgique: Annales,  
xlvi.
- Budapest, Hungary.*—Hungarian Central Bureau of Ornithology:  
Aquila, Vol. ix.
- Buenos Aires, Argentine.*—Museo Nacional: Annales, Vol. i: 2.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Anales,  
Vols. lv; lvi: 1-3.
- Calcutta, India.*—Geological Survey of India: Report, 1900-1901; Me-  
moirs, Vols. xxxii: 3; xxxiii: 3; xxxiv: 2; xxxv: 1.
- Cambridge, Mass.*—Harvard College Observatory: Report, 1903; An-  
nals, Vols. xlvi: 2; xlviii: 9; liii: 3, 4; lvi: 1; Circulars, Nos.  
74-75, 83-85.
- Cambridge, Mass.*—Museum of Comparative Zoology: Bulletin, Vols.  
xxxix: 6-8; xl: 5-7.
- Cape Town, South Africa.*—South African Philosophical Society:  
Transactions, Vols. xii, pp. 561-920; xiv: 1, 2.
- Catania, Italy.*—Accademia Gioenia di Scienze Naturali: Bulletin, Nos.  
74-78.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vols.  
xviii, xix.
- Chatham, Canada.*—Miramichi Natural History Association: Proceed-  
ings, No. 3.
- Cherbourg, France.*—Société Nationale des Sciences Naturelles: Me-  
moirs, Vol. xxxiii: 1.
- Chicago, Ill.*—Botanical Gazette: Vols. xxxv, xxxvi.
- Chicago, Ill.*—Chicago Academy of Sciences: Bulletin Nos. 3: 2, 4, 5;  
Spec. Publication No. 1.



- Chicago, Ill.*—Field Columbian Museum: Publications, Nos. 69-74, 76, 79, 80.
- Chicago, Ill.*—John Crerar Library: Annual Report, Vol. VIII; Suppl. to List of Serials.
- Chicago, Ill.*—Journal of Geology: Vol. XI.
- Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vol. XX: 3.
- Cincinnati, Ohio.*—Lloyd Library of Botany: Bulletin, No. 6; Mycological Notes, Nos. 10-14.
- Colorado Springs, Col.*—Colorado College: Studies, Vol. X.
- Columbia, Mo.*—University of Missouri: University Studies, Vols. I: 5; II: 1, 2.
- Denver, Col.*—Colorado Scientific Society: Proceedings, Vol. VII, pp. 55-138.
- Des Moines, Iowa.*—Iowa Academy of Sciences: Proceedings, Vols. VIII-X.
- Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Archiv, Vol. XII: 2; Sitzungsberichte, Vol. XIII: 1; Schrifter, No. 11.
- Fireze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 24-35.
- Frankfurt a d Oder, Germany.*—Naturwissenschaftlicher Verein: Helios, Vol. XX.
- Fribourg, Switzerland.*—Société Fribourgeoise des Sciences Naturelles: Bulletin, No. 10; Memoirs, Geol. Vol. III: 1; Chemie, Vol. II: 1; Math. Vol. I: 1.
- Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. XLII.
- Georgetown, British Guiana.*—Royal Agricultural and Commercial Society: Journal, 1902.
- Glasgow, Scotland.*—Natural History Society: Proceedings, Vols. V: 3; VI: 1-2.
- Granville, Ohio.*—Denison University: Bulletin, Vol. XII: 5-7.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. XXXIX.
- Griefswald, Germany.*—Naturwissenschaftlicher Verein: Mitteilungen, Vols. XXXIII, XXXIV.
- Groningen, Netherland.*—Naturkundig Genootschap: Bijdrag, Vol. II.
- Halifax, Nova Scotia.*—Nova Scotia Institute of Science: Proceedings, Vol. X: 4.
- Harlem, Netherlands.*—Musée Teyler: Archives, Vol. VIII: 1-4.
- Iowa City, Iowa.*—Iowa Historical Society: Journal, Vol. I.
- Iowa City, Iowa.*—State University of Iowa: Bulletin, No. LXVII.
- Kazan, Russia.*—Society of Naturalists of the Imp. University: Memoirs, Vols. XXXV: 6; XXXVI: 1-6; Protokol, 1901-1902.
- Kharkow, Russia.*—Society of Naturalists of the Imp. University: Travaux, Vols. XXXVI, XXXVII.
- Kief, Russia.*—Kief Society of Naturalists: Memoirs, Vol. XVII: 2.
- Kiel, Germany.*—Naturwissenschaftlicher Verein: Schriften, Vol. XII: 2.
- Kjöbenhavn, Denmark.*—Naturhistoriske Forening: Meddeleser, 1903.

- Krakowice, Austria.*—Akademie der Wissenschaften: Rosprawy, Vol. XLII.
- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vols. xxxviii: 145; xxxix: 146.
- Liège, Belgium.*—Société Géologique de Belgique: Bulletin, Vol. xxix.
- Lincoln, Neb.*—University of Nebraska: University Studies, Vols. II: 3, 4; III: 1-4.
- Liverpool, England.*—Geological Society: Proceedings, Vol. ix: 2, 3.
- Llinas, Spain.*—Observatorio Belloch: Meteorological Charts, 1902.
- Madison, Wis.*—Geological and Natural History Survey: Bulletin, Nos. 8-10.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs, Vol. XLVII.
- Manila, Philippine Ids.*—Museum of Natural History: Bull. Nos 1, 2.
- Metz, Germany.*—Société d' Histoire Naturelle: Bulletin, Vols. vi-x.
- Mexico, Mexico.*—Instituto Geologico Nacional: Bulletin, No. 16.
- Milwaukee, Wis.*—Natural History Society: Bulletin, Vol. II: 4.
- Missoula, Mont.*—University of Montana: Bulletin, Nos. 10, 17.
- Montevideo, Uruguay.*—Museo Nacional: Anales, Vol. iv, pp. 29-89, 123-152.
- Montgomery, Ala.*—Geological Survey of Alabama: Bulletin, No. 7.
- Montreal, Canada.*—Natural History Society: Record, Vol. ix: 1.
- Moskva, Russia.*—Imp. Moscow Society of Naturalists: Bulletin, 1903, 1.
- Nantes, France.*—Société Académique de la Loire-Inferieure: Annales, Vol. III.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxxv.
- New York, N. Y.*—Linnean Society: Abstracts, Vols. XIII, XIV.
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- Oberlin, Ohio.*—Oberlin College: Wilson Bulletin, Vol. ix.
- Osnabrück, Germany.*—Naturwissenschaftlicher Verein: Jahresbericht, 1900; Verhandlungen, Vol. xv.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Annual Report, Vol. XII; Catalogue of Canadian Birds, Part 2; Maps.
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- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. VIII.
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- Rochester, N. Y.*—Rochester Academy of Natural Sciences: Proceedings, Vol. iv, pp. 65-88, 93-136.
- Rovereto, Austria.*—Accademia degli Agiati in Rovereto: Atti, Vol. viii: 3, 4; ix: 1, 2.
- St. Gall, Switzerland.*—Naturwissenschaftlicher Gesellschaft: Bericht, 1901.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vol. xiv.
- St. Louis, Mo.*—St. Louis Academy of Science: Transactions, Vol. xiii. 1-4.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vols. xx: 7-10; xxi: 1-4; Memoirs, Vols. xv: 4; xvii: 1, 2; xviii: 3; xix: 1; xx: 2.
- Sankt Peterburg, Russia.*—Imp. Minerological Society: Materialien, Vol. xxi: 1; Verhandlungen, Vol. xl: 1.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Zool. 3: 5, 6.
- Seattle, Wash.*—Geological Survey: Annual Report, Vol. ii.
- Springfield, Mass.*—Museum of Natural History: Report, 1902-1903.
- Stavanger, Norway.*—Stavanger Museum: Aarshefte, Vol. xiii, 1902.
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- Sydney, New South Wales.*—Royal Society of New South Wales: Journal, Vol. xxxv.
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- Torino, Italy.*—Museo Zoologico di Torino: Bulletin, Vol. xvii.
- Toronto, Canada.*—Canadian Institute. Proceedings, Vol. ii: 5; Transactions, Vol. vii: 2.
- Toulouse, France.*—Académie des Sciences: Memoirs, Vol. ii.
- Upsala, Sweden.*—Geological Institute University of Upsala: Bulletin, Vol. v: 2.
- Urbana, Ill.*—Illinois State Laboratory: Bulletin, Vol. vi; Index to Vol v; Biennial Report, 1899-1900.
- Washington, D. C.*—Bureau of American Ethnology: Bulletin, No. 27.
- Washington, D. C.*—United States Geological Survey: Annual Reports, Vols. xxii, xxiii; Bulletin, Nos. 205-207, 209-217; Monographs,

Vols. XLII-XLV; Professional Papers, Nos. 1-10, 13-15; Water Supply, Nos. LXV-LXXXVI.

Washington, D. C.—National Museum: Bulletin, No. 52; Memoirs, Vol. VIII: 5; Proceedings, Vol. XXV.

Washington, D. C.—Patent Office: Official Gazette, Vols. CII-CVI.

Washington, D. C.—Smithsonian Institution: Annual Report, 1901.

Washington, D. C.—Weather Bureau: Monthly Weather Review, Vols. XXX: 11, 12; XXXI: 1-9; Report of Chief, 1901-1902.

Wiesbaden, Germany.—Naturhistorische Verein für Naturkunde: Jahrbuch, Vols. LV, LVI.

Winnipeg, Manitoba.—Manitoba Historical and Scientific Society: Annual Report, 1902; Transactions, No. 63.

Zurich, Switzerland.—Naturforschende Gesellschaft: Vierteljahrsschrift, Vols. XLVII: 3, 4; XLVIII: 1, 2.

Zurich, Switzerland.—Physikalischen Gesellschaft: Mitteilungen, Nos. 3-5.

The foregoing report summarized shows 798 accessions from 143 societies and institutions.

The election of officers resulted as follows:

President, - - - - - Professor C. W. Hall.

Vice President, - - - - - Dr. A. H. Elftman.

Recording Secretary, - - - Harlow Gale.

Corresponding Secretary, - - O. W. Oestlund.

Treasurer, - - - - - E. C. Gale.

Trustees for three years, - { N. H. Winchell.  
Dr. T. S. Roberts.

Trustee for two years,

To succeed Dr. Hosmer - T. B. Walker.

Professor Hall then gave a resume of the papers and discussions on the Mississippi river in Section D, St. Louis meeting of the American Association for the Advancement of Science.

#### 266th Meeting, March 8, 1904.

Psychological Laboratory of H. Gale, 812 S. 4th St.

Seven persons present.

President Hall in the chair.

The President announced that the Articles of Incorporation of the Academy were filed on March 31, 1876.

Professor John Zeleny read a paper on The Rate of Propagation of Smell.



## [ABSTRACT.]

The speed with which smell is propagated through air was investigated for some substances by letting the smell pass through tubes where the disturbing influence of convection currents in the air is practically avoided.

It was found that the speed is quite small, showing that the rapid propagation ordinarily observed in free space is due almost entirely to convection currents. For example with ammonia diffusing through a glass tube 1.5 meters long and .76 cms. in diameter, over two hours elapsed before the smell could be detected at the other end of the tube. With different lengths of tubing it was found for ammonia and hydrogen sulphide that the time required for the diffusion of the smell was roughly proportional to the square of the length.

The presence of ammonia could be detected chemically at a given point in a tube in about the same time as when the sense of smell was used for a detector.

The rate of propagation of the smell of ammonia was not markedly different when this had to pass along the same tube either horizontally or vertically upward or vertically downward. With camphor, however, while the rates horizontally and vertically downward were about the same, the speed upward was about twice as great.

The smell given to brass and iron by rubbing them with the fingers was also tried but gave no definite results.

Professor O. W. Oestlund gave a review of recent entomological literature, speaking especially upon some papers by Marie V. Linden on pigments of Lepidoptera.

**267th Meeting, April 11, 1904.**

Geology Lecture room, University of Minnesota.

Thirty persons present; President Hall in the chair.

Pursuant to notice at last meeting the yearly dues of resident members were reduced from \$3.00 to \$1.00, the same as of non-resident members. The President explained that this does not affect the customary election fee of \$5.00. Program: "The Gypsum Deposits of New York," by Mr. A. L. Parsons, being a preliminary report of his original studies under the Director of the N. Y. State Museum, illustrated with lantern slides and closing with an historical sketch of the process of manufacturing gypsum.

Wm. A. Bryan of the Bishop Museum, Honolulu, described this museum with the help of lantern slides. He then described his present work here in Pillsbury Hall, where he

has been for some weeks examining the unmounted Menage collection of Philippine Islands birds, as part of his plan of working up the birds of Polynesia as he has already done those of the Hawaiian Islands. At the close of his talk he showed many of the birds in his workroom.

**268th Meeting, May 11, 1904.**

Geology Lecture room, University of Minnesota.

Eighteen persons present; President Hall in the chair.

Program: Preliminary report on *Campodia Staphylinus*, a primitive wingless insect, found for the first time in the West, by Prof. O. W. Oestlund. This insect was discovered by one of Prof. Oestlund's pupils, Kenneth Taylor, and was shown under the microscope. A few specimens of *Scolopendrella Alanthia* were found associated with it at the same time. Its bearings on Evolution were discussed by Dr. Sardeson, Prof. Washburn, and others.

Rise of Geographical Societies in America, by Pres. C. W. Hall. Copies of the geographical magazines were shown in illustration. The lately-formed Geographical Society of Minnesota, its objects and work, were then outlined.

**269th Meeting, November 9, 1904.**

President Hall's study, University of Minnesota, 4 P. M.  
Five persons present.

President Hall read a letter from Miss Countryman, Librarian of the Public Library, about storing the museum cases until the room intended for the Academy on the second floor is finished. The former room of the museum has been assigned during the past year by the Library Board to the library. Miss Countryman also suggested a lease of the museum to the Library Board.

It was announced that a bulletin on the Menage Expedition was ready for printing.

Program: Dr. Sardeson reported the discovery in this vicinity of a coral *Tetradium*, and later he had found many of them in a quarry. They occur in the Galena Series.

H. Gale described Herbert Spencer's scientific method of work as described in his lately published autobiography.



## 270th Meeting, December 7, 1904.

Directors' room, Public Library.

President Hall presiding.

Program: "The Great Fault Line of Eastern Minnesota," by President C. W. Hall. The paper was illustrated by maps and profiles. Discussion by Prof. Winchell, Drs. Sardeson and Elftman.

"A Remarkable Glacial Plowing in Minneapolis," by Dr. F. W. Sardeson. This was followed by discussion.

## 271st Meeting, January 3, 1905.

## ANNUAL MEETING.

Fifteen members and visitors present.

President Hall in the chair.

H. B. Norton was elected to membership.

Report of the Treasurer, E. C. Gale, showed he had handled \$1,060.55 and had a balance on hand of \$345.11; it was referred to the Trustees for auditing.

Corresponding Secretary Oestlund reported 381 accessions to the library during the year, and that a bulletin of the Academy would appear in about a month.

## Accessions to the Library for the year 1904:

*Adelaide, South Australia.*—Royal Geographical Society: Proceedings, Vols. vi and vii.

*Agram, Hungary.*—Jugoslavenska Akademija: Ljetopis, Vol. xviii; Rad, Nos. 154, 155.

*Agricultural College, Mich.*—Michigan Agricultural College: Bulletin, Nos. 211-220; Special Bulletin, Nos. 24, 25, 27-29.

*Albany, N. Y.*—State Library: Annual Report, 1903; Bulletin, Nos. 84-86, 88.

State Museum: Annual Report, 1901; Bulletin, Nos. 63, 68-76.

University of N. Y.: Regents' report, 1903.

*Baltimore, Md.*—Johns Hopkins University: Circular, Nos. 2, 3, 5, 7, 8.

*Barcelona, Spain.*—Real Academia di Ciencias y Artes: Memoirs, Vols. iv, 37-40; v, 1. Nomina Personal, 1903.

*Basel, Switzerland.*—Naturforschende Gesellschaft: Verhandlungen, Vol. xv: 2.

*Belfast, Ireland.*—Natural History and Philosophical Society: Proceedings, 1902-1903.

- Bergen, Norway.*—Bergens Museum: Aarberetning, 1903; Aarbog, 1903, 2; 1904, 1.
- Berkeley, Cal.*—University of California: Publication, Vol. i, Nos. 2-4, 6, 7.
- Berlin, Germany.*—R. Friedländer & Sohn: Naturæ novitates, 1904, 1-18.
- Béziers, France.*—Société d' Etude des Sciences Naturelles: Bulletin, Vols. xxiii-xxv.
- Bologna, Italy.*—Accademia delle Scienze dell' Istituto di Bologna: Memoirs, Vol. ix; Rendiconto, Vols. v, vi.
- Bombay, India.*—Royal Asiatic Society: Journal, Vol. xxi, No. 58.
- Bône, Algeria.*—Académie d' Hippone: Comptes Rendus, 1901; Bulletin, No. 30.
- Boston, Mass.*—American Academy of Arts and Sciences: Proceedings, Vols. xxxix, 13-24; xl, 1-10.
- Boston, Mass.*—Boston Society of Natural History: Proceedings, Vols. xxxi, 6-10; xxxii, 1, 2.
- Boston, Mass.*—Horticultural Society: Transactions, 1904; 1.
- Boulder, Col.*—University of Colorado: Dept. of Psychol. ii, 1; Studies, i, 4; ii, 1, 2.
- Braunschweig, Germany.*—Verein für Naturwissenschaft: Jahresbericht, Vols. ix, xiii.
- Bremen, Germany.*—Naturwissenschaftlicher Verein: Abhandlungen, Vol. xvii, 3.
- Brisbane, Queensland.*—Geological Survey of Queensland: Publications, Nos. 184-195.
- Brisbane, Queensland.*—Royal Society of Queensland: Proceedings, Vol. xviii.
- Brooklyn, N. Y.*—Institute of Arts and Science: Memoirs, Vol. i, 1.
- Brünn, Austria.*—Naturforschender Verein: Bericht, Vol. xxi; Verhandlungen, Vol. xli.
- Bruzelles, Belgium.*—Société Royale de Botanique: Bulletin, Vol. xl.
- Budapest, Hungary.*—Hungarian Central Bureau of Ornithology: Aquila, Vol. x.
- Buenos Aires, Argentine.*—Instituto Geographico Argentino: Bulletin, Vols. xxi, xxii, 1-6.
- Buenos Aires, Argentine.*—Museo Nacional: Anales, Vols. ii, iii.
- Buenos Aires, Argentine.*—Sociedad Científica Argentina: Anales, Vols. lvi, 4-6; lvii; lviii, 1-3.
- Calcutta, India.*—Geological Survey of India: Report, 1902-'03; Memoirs, Vols. xxxiv, 3; xxxv, 2; xxxvi, 1; Paleontol, Vols. iii, 2; iv, xiv, 5; Records, Vol. xxxi, 1, 2.
- Cambridge, Mass.*—Harvard College Observatory: Annual Report, 1902; Annals, Vols. xlvi, 1; xlviii, 3-8; li; Circular, Nos. 51-73.
- Cambridge, Mass.*—Museum of Comparative Zoology: Bulletin, Vols. xli, 2; xlii, 1-4.
- Cape Town, South Africa.*—South African Philosophical Society: Transactions, Vols. xiii, pp. 1-293; xiv, 3-5; xv, 1, 2.



- Catania, Italy.*—Accadèmia Gioenia di Scienze Naturali: Bulletin, Nos. 79-82.
- Chapel Hill, N. C.*—Elisha Mitchell Scientific Society: Journal, Vol. xx.
- Chemnitz, Germany.*—Naturwissenschaftlicher Gesellschaft: Bericht, Vol. xv.
- Chicago, Ill.*—Botanical Gazette: Vol. xxxvii, 1-4.
- Chicago, Ill.*—Field Columbian Museum: Publications, Nos. 75, 77, 78, 81-93.
- Chicago, Ill.*—John Crerar Library: Annual Report, Vol. ix; List of Books on Industrial Arts.
- Chicago, Ill.*—Journal of Geology, Vol. xii, 1, 2.
- Christiania, Norway.*—Videnskabs Selskab: Förhandlingar, 1902; 1903, 1-8; Skrifter, 1902, 1903.
- Chur, Switzerland.*—Naturforschende Gesellschaft Graubündens: Jahresbericht, Vol. xlvi.
- Cincinnati, Ohio.*—Cincinnati Society of Natural History: Journal, Vol. xx, 4.
- College Hill, Mass.*—Tufts College: College Studies, No. 8.
- Colorado Springs, Col.*—Colorado College: College Studies, Vols. xi, xii.
- Columbia, Mo.*—University of Missouri: Studies, Vol. ii, 3-5; Bulletin, Vol. v, 5; Negroes of Columbia, Elwin.
- Columbus, Ohio.*—Geological Survey of Ohio: Bulletin No. 1.
- Denver, Col.*—Colorado Scientific Society: Proceedings, Vol. vii, pp. 267-340.
- Des Moines, Iowa.*—Geological Survey of Iowa: Annual Report, Vols. xiii, xiv.
- Dorpat, Russia.*—Naturforscher Gesellschaft bei der Universität: Schrifter, No. 12; Sitzungsberichte, Vol. xiii, 2.
- Emden, Germany.*—Naturforschende Gesellschaft: Jahresbericht, Vol. lxxxvii.
- Firenze, Italy.*—Biblioteca Nazionale Centrale: Bulletin, Nos. 36-47.
- Frankfurt a' d Oder, Germany.*—Naturwissenschaftlicher Verein: Helios, Vol. xxi.
- Fribourg, Switzerland.*—Société Fribourgeoise des Sciences Naturelles: Bulletin, No. 11; Memoirs, Vols. Chem. ii, 1; Geol. iii, 1; Math. i, 1.
- Genève, Switzerland.*—Société de Géographie: Le Globe, Vol. xliii.
- Granville, Ohio.*—Denison University: Bulletin, Vol. xii, 8-11. Index to Vols. i-x.
- Graz, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. xl.
- Greifswald, Germany.*—Naturwissenschaftlicher Verein: Mitteilungen, Vol. xxxv.
- Guéret, France.*—Société des Sciences Naturelles: Memoirs, Vol. ix, 1.
- Habana, Cuba.*—Academia di Ciencias: Anales, Vols. xxxviii, xli, li.
- Hamburg, Germany.*—Verein für Naturwissenschaftliche Unterhaltung: Verhandlungen, Vol. xii.
- Harlem, Netherlands.*—Musée Teyler: Archives, Vol. viii, 5.

- Hermannstadt, Austria.*—Siebenbürgischer Verein für Naturwissenschaften: Verhandlungen, Vol. LII.
- Innsbruck, Austria.*—Naturwissenschaftlich-Medizinischer Verein: Berichte, Vol. xxviii.
- Iowa City, Iowa.*—Iowa Historical Society: Journal, Vol. II.
- Iowa City, Iowa.*—State University of Iowa: Bulletin, Nos. 57, 62, 74, 88.
- Kassel, Germany.*—Verein für Naturkunde: Abhandlungen, Vol. XLVIII.
- Kjöbenhavn, Denmark.*—Naturhistoriske Forening: Meddelelser, 1904.
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- Lausanne, Switzerland.*—Société Vandoise des Sciences Naturelles: Bulletin, Vol. xxxix, Nos. 147, 148.
- Lawrence, Kans.*—Kansas State University: Bulletin, Vol. II, 10-15.
- Le Havre, France.*—Société de Géologie de Normandie: Bulletin, Vols. xxii, xxiii.
- Liège, Belgium.*—Société Géologique de Belgique: Bulletin, Vol. xxx.
- Lincoln, Nebr.*—University of Nebraska: Studies, Vol. iv, 1-3.
- Llinas, Spain.*—Observatorio Belloch: Meteorological Charts, 1903.
- Lüneberg, Germany.*—Naturwissenschaftlicher Verein: Jahreshefte, Vol. xvi.
- Madison, Wis.*—Wisconsin Academy of Sciences: Transactions, Vols. xiii, xiv, 1.
- Manchester, England.*—Manchester Literary and Philosophical Society: Memoirs, Vol. XLVIII, 1-3.
- Manila, Philippine Ids.*—Museum of Natural History: Bull., Nos. 3, 4.
- Metz, Germany.*—Société d' Histoire Naturelle: Bulletin, Vol. xi.
- Mexico, Mexico.*—Instituto Geologico Nacional: Paregonos, Vol. I, 1-5.
- Milwaukee, Wis.*—Public Museum: Annual Reports, Vols. xxi, xxii.
- Montevideo, Uruguay.*—Museo Nacional Anales: Vol. I.
- Montgomery, Ala.*—Geological Survey of Alabama: Bulletin, No. 8; Index to Mineral Resources.
- Montreal, Canada.*—Natural History Society: Record, Vol. ix, 2.
- Moskva, Russia.*—Imp. Moscow Society of Naturalist's: Bulletin, 1903, 2, 3; 1904, 1.
- Neuchâtel, Switzerland.*—Société des Sciences Naturelles: Bulletin, Vol. xxviii.
- New York, N. Y.*—American Geographical Society: Bulletin, Vol. xxxvi.
- Oberlin, Ohio.*—Oberlin College: Wilson Bulletin, Vols. x, xi, 1.
- Ottawa, Canada.*—Geological and Natural History Survey of Canada: Annual Report, Vol. xiii; Altitudes of Canada; Dictionary of Altitudes; Catalogue of Birds; Pt. 3.
- Padova, Italy.*—Società Vento-Trentina di Scienze Naturali: Atti, Vol. I, 1.
- Paris, France.*—Museum d' Histoire Naturelle: Bulletin, 1903; 3-8; 1904, 1-6.
- Paris, France.*—Société d' Ethnographie: Bulletin, Vol. XLII, 120- 122; Memoirs, Vol. iv, 13.



- Penzance, England.*—Royal Geological Society of Cornwall: Transactions, Vol. ix.
- Philadelphia, Pa.*—Academy of Natural Sciences: Proceedings, Vols. LV, 3; LVI, 1, 2.
- Philadelphia, Pa.*—Zoological Society of Philadelphia: Annual Report, Vol. xxxii.
- Pisa, Italy.*—Società Toscana di Scienze Naturali: Atti, Vol. xiv, 1-5.
- Pittsburg, Pa.*—Carnegie Museum: Annals, Vol. II, 2-4; Memoirs, Vol. I, 4; Publ. Vol. xxviii.
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- Regensburg, Germany.*—Naturwissenschaftlicher Verein: Berichte, Vol. ix.
- Rochester, N. Y.*—Rochester Academy of Natural Sciences: Proceedings, Vol. iv, pp. 137-148.
- Rovereto, Austria.*—Accademia degli Agiati in Rovereto: Atti, Vols. ix, 3, 4; x, 1, 2.
- St. Gall, Switzerland.*—Naturwissenschaftliche Gesellschaft: Bericht, 1902.
- St. Johns, New Brunswick.*—Natural History Society: Bulletin, Vols. xxi, xxii.
- Saint-lô, France.*—Société d'Agriculture et d'Histoire Naturelle de la Manche: Memoirs, Vols. xx, xxi.
- St. Louis, Mo.*—Missouri Botanical Garden: Annual Report, Vol. xv.
- St. Louis, Mo.*—St. Louis Academy of Science: Transactions, Vols. xiii, 5-9; xiv, 6.
- Sankt Peterburg, Russia.*—Geological Committee: Bulletin, Vols. xxi, 5-10; xxii, 1-4; Memoirs, Vols. xiii, 4; xv, 1; xvi, 2; xvii, 3; xix, 2; xx, 1; N. Ser. 1, 2, 4-9, 12.
- Sankt Peterburg, Russia.*—Imp. Minerological Society: Materialien, Vol. xxi, 2; Verhandlungen, Vols. xl, 2; xli, 1.
- San Francisco, Cal.*—California Academy of Sciences: Proceedings, Vols. Geol. I, 10; Zool. III, 7-13.
- Santiago, Chile.*—Société Scientifique du Chile: Actes, Vols. xii, xiii, 1-3.
- Semur-en-Auxois, France.*—Société des Sciences Historiques et Naturelles: Bulletin, 1903.
- Stavanger, Norway.*—Stavanger Museum: Aarshefte, Vol. xiv, 1903.
- Stockholm, Sweden.*—Kongl. Svenska Vetenskaps-Akademien: Archiv. Bot. Vols. II, III, 1-3; Kemi, Vol. I, 2; Zool. Vol. I, 3, 4; Arsbok, 1904.
- Stockholm, Sweden.*—Entomologiska Föreningen: Tidskrift, Vol. xxiv.
- Sydney, New South Wales.*—Australian Museum: Report, 1902.
- Sydney, New South Wales.*—Geological Survey of New South Wales: Annual Report, 1902, 1903; Memoirs, Geol. No. 3.
- Sydney, New South Wales.*—Royal Society of New South Wales: Vol. xxxvi.
- Thorn, Germany.*—Copernicus Verein für Wissenschaft und Kunst: Festschrift; Mitteilungen, Vol. xiii.

- Torino, Italy.*—Museo Zoologico di Torino: Bulletin, Vol. xviii, pp. 433-458.
- Toronto, Canada.*—Canadian Institut: Transactions, Vol. vii, 3.
- Toulouse, France.*—Académie des Sciences: Memoirs, Vol. iii.
- Trencsin, Hungary.*—Naturwissenschaftlicher Verein: Jahresheft, 1902, 1903.
- Urbana, Ill.*—Illinois State Laboratory: Bulletin, Vol. vii, 1-3; Fish Com. Report, 1900-'02.
- Washington, D. C.*—Bureau of American Ethnology: Annual Report, Vol. xx.
- Washington, D. C.*—United States Geological Survey: Annual Report, Vol. xxiv; Bulletin, Nos. 208, 218, 233, 244; Mineral Resources, 1902; Monograph, Vol. xlvi; Professional Papers, 11, 12, 16-28; Water Supply, Nos. 87-96, 101, 102, 104.
- Washington, D. C.*—National Museum: American Hydroids, Part 2; Proceedings, Vol. xxvii.
- Washington, D. C.*—Patent Office: Official Gazette, Vols. cvii-cxii, cxiii, 1-8.
- Washington, D. C.*—Smithsonian Institution: Annual Report, 1902; International Exchange List.
- Washington, D. C.*—Weather Bureau: Bulletin, L. M.; Monthly Weather Review, Vols. xxxi, 10-13; xxxii, 1-9; Report of Chief, 1902-'03; Weather Folk Lore.
- Wien, Austria.*—Naturwissenschaftlicher Verein: Mitteilungen, 1903-1-8.
- Winnipeg, Manitoba.*—Manitoba Historical and Scientific Society: Annual Report, 1903; Transactions, Nos. 64-66.
- Zurich, Switzerland.*—Naturforschende Gesellschaft: Vierteljahrschrift, Vol. xlviii, 3-4.
- Zurich, Switzerland.*—Physikalischen Gesellschaft: Mitteilungen, Nos. 6, 7.

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Program: Some Geological Problems of the Black Hills, by Dr. A. H. Elftman.

Many charts and specimens of rocks and ores were exhibited in illustration of the paper.

The following officers were elected:

President,	- - - -	C. W. Hall.
Vice President,	- - -	Dr. A. H. Elftman.
Recording Secretary,	- -	Harlow Gale.
Corresponding Secretary,	-	O. W. Oestlund.
Treasurer,	- - - -	Edw. C. Gale.
Trustees, for three years,	-	{ H. T. Eddy. E. C. Gale.



## 272d Meeting, February 6, 1905.

Thirteen members and visitors present.

President Hall in the chair.

Program: An informal talk on Recent Experiments with Homing Pigeons was given by Mr. Fred M. May, Secretary of the Minnesota section of the National Federation of Homing Pigeon Fanciers. Mr. May showed two of his homing pigeons, describing their training, races, records of speed, manner of starting and landing.

Deep wells as a source of water for Minneapolis, by Professor N. H. Winchell.

## [ABSTRACT]

The author showed an outline map of the city on which were indicated the location and the depth of over sixty of the deep wells of the city, some of them being truly artesian. These included only those which are less than 450 ft. in depth, the deeper wells being excluded from the showing because of the greater mineralization of the water from the deeper strata. He stated that the water from the shallower wells is wholesome, clear, and has about the hardness of the water in the river, and hence is suitable for all domestic uses and for steam making. This source of water for city supply has been discredited because of the fact that numerous (perhaps the majority of) deep wells in the city are so deep that they derive their water from the lower strata, from 600 ft. to 800 ft., or 900 ft. below the surface. These waters incrust the boilers with a very troublesome scale and this scale sometimes has been known to choke the supply pipes. This trouble would be obviated or much reduced, by use of the shallower wells.

He also showed a map of the state on which were roughly expressed the limits of the water basins of the Jordan and the St. Peter sandstones which lie below Minneapolis and supply the shallower wells of the city. If one-tenth of their cubic contents may be assumed to be filled by water, the author stated that the gallons in the St. Peter basin amount to 4,054,110,793,200 and the water in the Jordan sandstone, about 400 ft. below the surface, amounts to 18,919,196,078,220 gallons. These subterranean basins are kept full by the streams and all surface drainage that cross their outcrop at points distant from the city at higher positions, including the Mississippi and nearly all its northern tributaries. The Mississippi itself is the surplus overflow and is less constant, as a source for the city, than the subterranean reservoirs. Water from these basins rises nearly to the surface throughout the city, and in low places it overflows in artesian style.

The author maintained that this source for city water should be used instead of an expensive plant for filtering the river water.

(This paper is incorporated in a more extended article on the



same subject published in the *American Geologist* for May, 1905, vol. xxxv, pp. 266-291.)

**273d Meeting, March 7, 1905.**

Twelve persons present; President Hall in the chair.

Program: An informal account, aided by charts and maps, of the work of the U. S. and Canadian Boundary Survey in the Rocky Mountains, was given by Mr. F. A. Camp, who was in charge of one of the survey parties in 1904.

Pres. Hall then showed a fine collection of photographs to illustrate the Geography and Geology of the Canadian Rockies. Much discussion.

**274th Meeting, May 9, 1905.**

Twenty present; President Hall presiding.

Program: Explorations of Verendrye and his sons, in connection with the History and Geography of Northern Minnesota, by Warren Upham, Secretary of the Minnesota Historical Society. (See paper K.)

An informal report was made by Harlow Gale of a Case of Multiple Personality by Dr. Albert Wilson in Vol. 18, pp. 352-418, of the *Proceedings of the Society for Psychical Research*. Some of the wider psychological bearings of the case were presented and discussed.

**275th Meeting, October 10, 1905.**

The four members present on this stormy night exchanged most pleasantly and profitably their experiences in summer scientific work and reading. Prof. Winchell showed two of his own photographs of the Willamette meteorite at the Lewis & Clark Exposition at Portland. This largest meteorite in the United States is 4 ft. in height through its cone shape, 10 ft. in diameter in its base, and weighs towards 15 tons. The peculiar drill-like perforations about its base seem to be due to air friction, while the sponge-like structure of its bottom, which was towards the surface and not much covered, Prof. Winchell thought due to the decomposition of some other mineral substances in the iron.

Dr. Sardeson reported having found some specimens of *Porocrinus*, and in fact he had recognized a zone at various points about Minneapolis identical with that about Toronto



and Baffin's Land, so that the same shore line had run through these three places.

Professor Arndt reported on his investigations into original methods of teaching science.

H. Gale reported on the interesting picture of scientific activity, mingled with a broad culture, found in the delightful "Briefe von Dr. Theo. Billroth."

**276th Meeting, November, 1905.**

Secretary's minutes lacking.

Paper L, Psychology of the Business Man by Harlow Gale.

**277th Meeting, December 5, 1905.**

Secretary's minutes lacking.

Paper M, Glacial and Modified Drift of the Mississippi Valley from Lake Itasca to Lake Pepin, by Warren Upham.

Paper N, Meteorological Statistics covering the period from 1895 to 1905 inclusive, furnished from the records kept at Minneapolis should have been announced at this meeting for publication.

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[*Paper J.*]

A MINERAL RESEMBLING MEERSCHAUM FROM  
THE SERPENTINE RANGE OF HAMPDEN  
COUNTY, MASS., WITH DESCRIPTIONS  
OF INTERESTING INCLUDED CRYSTALS.

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By A. D. Roe.

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I.—DESCRIPTIVE.

While prospecting for cabinet specimens in the fruitful mineral field of Hampden and Hampshire counties, Mass., I noticed a substance which the chemist of the Hampden Paint company called meerschaum. On interviewing the chemist, I was shown small pieces found in the disintegrating serpentine material they were using in the manufacture of chrome paints.

On my next excursion to Chester in Hampden county, I accompanied Dr. Lucas, the inventor of the chrome paint pro-